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Kent R. Van Horn, Director of Research, and T. W. Bossert, Vice-President, Aluminum Co. of America, 1961 Eisenman Award Winner (See Article, p. 5)

STACK

September, 1961

MR

METALS REVIEW

The News Digest Magazine

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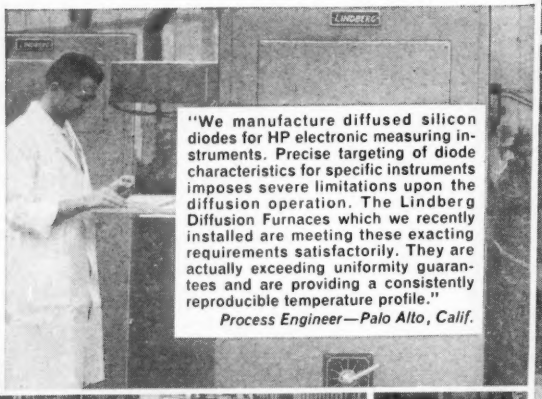
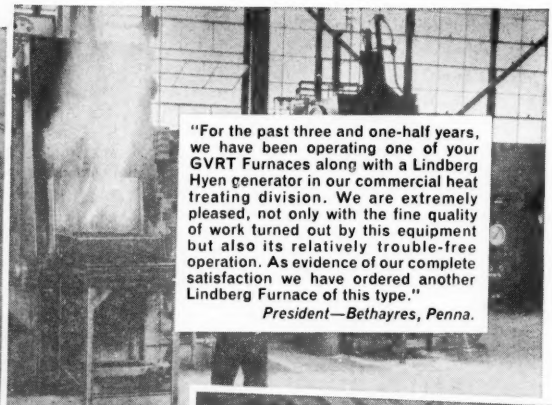
WE ENJOY HEARING GOOD THINGS about our products and services, just like everyone else. True, we get complaints now and then, but we're happy that most of our customers can and do say good things about their Lindberg equipment. The quotations below are typical.



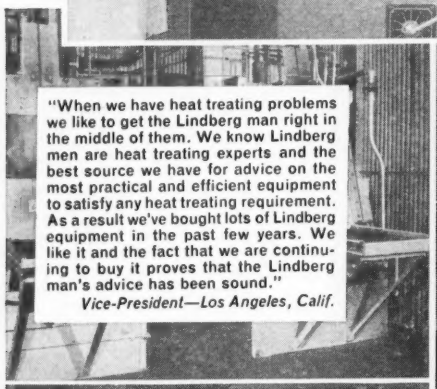
"We manufacture diffused silicon diodes for HP electronic measuring instruments. Precise targeting of diode characteristics for specific instruments imposes severe limitations upon the diffusion operation. The Lindberg Diffusion Furnaces which we recently installed are meeting these exacting requirements satisfactorily. They are actually exceeding uniformity guarantees and are providing a consistently reproducible temperature profile."

Process Engineer—Palo Alto, Calif.



"For the past three and one-half years, we have been operating one of your GVRT Furnaces along with a Lindberg Hyen generator in our commercial heat treating division. We are extremely pleased, not only with the fine quality of work turned out by this equipment but also its relatively trouble-free operation. As evidence of our complete satisfaction we have ordered another Lindberg Furnace of this type."

President—Bethayres, Penna.



"When we have heat treating problems we like to get the Lindberg man right in the middle of them. We know Lindberg men are heat treating experts and the best source we have for advice on the most practical and efficient equipment to satisfy any heat treating requirement. As a result we've bought lots of Lindberg equipment in the past few years. We like it and the fact that we are continuing to buy it proves that the Lindberg man's advice has been sound."

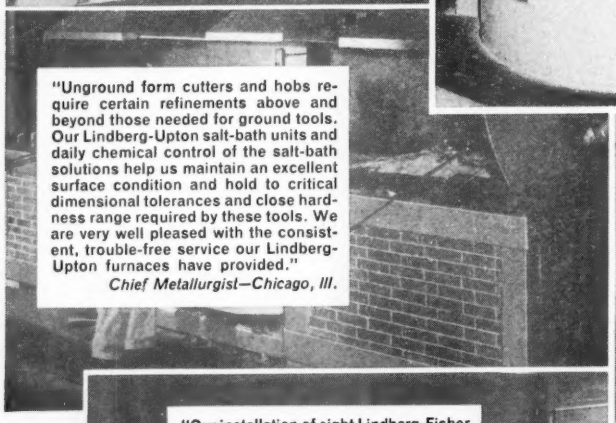
Vice-President—Los Angeles, Calif.

"The Lindberg heat-treating furnaces and atmosphere generating equipment installed two and one-half years ago provided a fine solution to a big problem of ours. The units give us complete and precise control over hardening and treating of gears for our high-pressure pumps. During these years, the equipment has proven trouble-free, required little maintenance and has been remarkably easy to operate."

Chief Engineer—Youngstown, Ohio

"When we designed our Florida plant, we knew we would be called upon to offer scientifically controlled, high quality heat treating for a variety of metals, both ferrous and non-ferrous, and an unusual diversity of sizes, shapes and weights. Our long experience with Lindberg furnaces and atmosphere controls assured us that we could depend on them to help us meet most efficiently the widely varying demands of our customers."

President—Fort Lauderdale, Fla.



"Unground form cutters and hobs require certain refinements above and beyond those needed for ground tools. Our Lindberg-Upton salt-bath units and daily chemical control of the salt-bath solutions help us maintain an excellent surface condition and hold to critical dimensional tolerances and close hardness range required by these tools. We are very well pleased with the consistent, trouble-free service our Lindberg-Upton furnaces have provided."

Chief Metallurgist—Chicago, Ill.

"Our Lindberg equipment supplies the uniformity of heat distribution and the fast accurate control that is needed for the exacting requirements of our product. The furnace responds to control almost instantaneously and maintains the temperature within plus or minus 5°. Results obtained have satisfied us completely with this, the latest of our Lindberg furnaces."

Chief Metallurgist—Des Plaines, Ill.

"Our installation of eight Lindberg-Fisher Melting and Holding Furnaces has given remarkable service for more than four years. With the help of a well executed maintenance program, the installation has been unusually trouble-free. Only one of the eight furnaces has required relining. Handling more than 1,000,000 pounds of aluminum and zinc annually, the installation has unfailingly provided the consistently high quality of metal our precision instruments require."

Production Engineer—Minneapolis, Minn.

During the past year these favorable comments have been featured in our business paper advertising. We'll be happy to identify the companies and individuals on request. **LINDBERG ENGINEERING COMPANY**, 2480 W. Hubbard St., Chicago 12, Ill.

Los Angeles Plant: 11937 S. Regentview Ave., Downey, Calif.
In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 3, Ont.

LINDBERG
heat for industry

September, 1961 Vol. XXXIV, No. 9

METALS REVIEW

The News Digest Magazine

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Contents

T. W. Bossert . . . 1961 Eisenman Award Winner 5

1961 National Metal Congress and Exposition—Special Section
- Best Metal Show Yet 7
- Detroit Chapter Lends Support 8
- Bud Guest Awards Dinner Speaker 8
- Young Authors Award 8
- Gen. Schriever Banquet Speaker 9
- Steel Companies at Metal Show 9
- Ladies Entertainment 9
- ASM Awards to Distinguished Metals Scientists 10
- Technical Program 11

Transactions Committee Defines Requirements for Technical Notes, by T. E. Leontis 13

Uses of Literatures Searching . . . A Metal Congress Special 14

ASM Regional Conference and Exhibit Scheduled for Houston 15

Indiana Symposium on Vacuum Metallurgy 17

Important Chapter Lectures

New Developments in Metal Removal, by Norman Zlatin 19

Temper Embrittlement, by Clarence A. Siebert 20

Application of Impact Hammers to Forging Quality, by Robert P. Daykin 21

Chapters in Print

Boston	15, 16	Muncie	17
Brooklyn Polytech	16	Notre Dame	16, 17
Calumet	17	Pittsburgh	19
Cincinnati	19	Purdue	17
Detroit	20	Rochester	16
Ft. Wayne	17	Terre Haute	17
Indianapolis	17, 21	Texas	20
Jackson	16	Worcester	16

Departments

Editor's Page	4	Obituaries	19
Chapter Prints	16	New Books	20
Men in Metals	18	3-Minute Glass	26
Employment Service Bureau	22		

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The Editor's Page

Many readers of *Metals Review* are deeply concerned with the problem of interesting young people in careers in metallurgy, metallurgical engineering or materials engineering. Just how to arouse the interest of precollege youngsters has caused considerable head scratching. One rather obscure news item in a recent issue of the *Wall Street Journal* offers a strong clue to effecting a new look at the fields enumerated above. Information released by the Illinois Institute of Technology showed that engineering graduates of the class of 1961 received the highest average starting salaries of any class in the school's history. The average figure was $550 per month. Topping the entire list, according to school authorities, were metallurgical engineering graduates who received an average starting salary of $590 per month. The latest figure was $70 per month higher than the year previous.

It appears that the new recognition given by industry to materials is reflected in industry's desire to find men prepared to help solve its problems.

Rare Earth Names

Have you ever wondered why and how some metallic elements got their names? Recently we came across an explanation of how some of the rare earth metals acquired their designations. As an example, yttrium, terbium, erbium and ytterbium all derived their names from that of the town of Yitterby in Sweden. Europium was named for Europe; gadolinium was named for Gadolin, discoverer of the ore; and holmium was named for Stockholm. Similar name derivations are applicable to many other of the minor elements now coming into prominence as our demands for materials performances become greater.

A New Malady

Perhaps hardware disease is not new to farmers, but it has been concealed from city folk rather successfully up to the present. Control of the disease is almost as strange as the malady but at the same time quite logical. Hardware disease results from small pieces of metal—nails, wire, screws and such—being swallowed by livestock along with food. The result is loss of appetite, irritability and loss of milk production. The cure—use of a permanent magnet. One magnet, according to Arnold Engineering, lasts the lifetime of the cow. The magnet is placed in the cow's second stomach where it attracts and holds the metal particles and keeps them safely away from vital organs. Some particularly avid and careless eaters in the bovine family pick up as much as three-quarters of a pound of metal during a lifetime. At least magnets removed at slaughtering time have had that much metal attached.

Numbers Game

It was inevitable that sooner or later we would need new prefixes to designate numercial designations as our use of figures rushes to the extremes of largeness and smallness. Recently the National Bureau of Standards announced the adoption of four new prefixes of multiples and submultiples, two at either extreme. On the high side we now have *tera* to designate the figure 1,000,000,000,000 (10 to the 12th power) and *giga* to identify 1,000,000,000 (10 to the 9th power). The newcomers to the ranks of submultiples are *nano* to designate 10 to the minus 9th of 0.000,000,001 and *pico* for 0.000,000,000,001 (10 to the minus 12th power). The new prefixes are added to the well-known deka, hecto, kilo and mega or deci, centi, milli and micro.

Gala Affair

Those of you planning to attend the Metal Congress in Detroit next month—and we hope to see all of you—should plan to take in at least two events over and above the show and technical sessions. We refer to ASM's annual meeting on the morning of Wednesday, Oct. 25, and the annual banquet Thursday, Oct. 26. The former is recommended to help you keep abreast of your Society's activities. The latter will represent a new departure in ASM social activities. You will receive further details later, but we can tell you that in addition to an important talk by a top military leader you will be treated to a cocktail party, entertainment and, to close the evening, a dance. Plan to make this event a must on your schedule, and if possible, bring your wife; she too will enjoy it.

Awesome Sight

Speaking of the Metal Show, we never fail to be amazed at the immensity of Cobo Hall in Detroit, scene of the Show. Recently we were in the Hall and saw it arranged for a concert with 8000 chairs in just one of the three halls located on the main floor. It is possible for three major functions to be carried on at the same time on this one floor with each being oblivious of the other. Of course, the Metal Show will utilize most of this space and will be the only event scheduled there at the time. See you there!

T. C. DuMond

ASM Members—Admission to the National Metal Congress and Exposition is by your ASM Membership Card or $2.00. Don't forget your membership card!

T. W. Bossert . . .
1961 Eisenman Award Winner

If one were to characterize this year's Eisenman Award winner in a phrase, the important key words would unquestionably be . . . "an energetic, technically knowledgeable, self effacing executive who gets things done with quiet authority".

Theodore W. Bossert, an outstanding scientific researcher in his 38 years with Aluminum Co. of America, is an excellent administrator who enjoys a degree of personal respect accorded to few men who have risen to the heights of his position. As the Alcoa vice-president in charge of research and development, he describes the technical accomplishments of the company as the result of coordinated and enthusiastic efforts of a closely knit research and development team.

Part of his responsibilities include the coordination of his firm's various divisions and laboratories engaged in research; product, process and equipment development; and all metallurgical engineering activities at the various plants.

Throughout his career with Alcoa—which began in 1923, two years after graduation from the Massachusetts Institute of Technology—Mr. Bossert has been active in the practical application of metallurgy to the production and fabrication of aluminum and magnesium alloys and to the development of widening markets for the company's burgeoning product line.

Soon after he joined the company, he was assigned responsibilities in the experimental mill at New Kensington, Pa., involving melting and casting practices, rolling, heat treating and the development of new alloys.

These activities were not confined wholly to wrought materials, as indicated by a paper published in 1926 on "The Effect of Melting and Casting Temperature on Grain Size of Sand Castings", which noted for the first time the "inheritance" effect of melting temperature on subsequent grain size of the casting.

In 1929, he transferred to the Alcoa Research Laboratories as assistant chief metallurgist under E. H. Dix, Jr. Mr. Bossert moved to company headquarters in Pittsburgh in 1930, and was made assistant chief metallurgist of the metallurgical department, fabrication division, five years later. This department is responsible for all metallurgical control and development work carried out at the fabricating plants.

During this period, many new alloys — notably 24S, 27S and 53S — were successfully introduced. For the first time, rolled plates of 27S (2027) were installed on a bridge–Pittsburgh's Smithfield St. Bridge (1932)— and Mr. Bossert, who can see the bridge from his 29th floor office in the Alcoa Bldg., takes great pride in reporting that "the aluminum system of the bridge is still in good shape!"

Another extremely important accomplishment of this period, in which Mr. Bossert played a major role, was the successful development of D.C. (direct chill) ingot casting, which was under the direct supervision of W. T. Ennor at the company's Massena, N.Y., operations. "The introduction of the D.C. ingot process eliminated most of the defects common to ingot cast by other methods available at the time", Mr. Bossert explained, "and permitted production of bigger and better ingots for subsequent rolling, forging or extruding".

This development was a revolutionary factor in the fabrication of wrought products, not only because it virtually eliminated certain defects inherent with ingots made by older methods, but it also removed the limitation on the maximum size of ingots which could be produced. As a result, the aluminum indus-

The William Hunt Eisenman Award was established by the American Society for Metals to recognize unusually distinguished service in the practical application of metallurgy to the production of metals or their engineering use. The first recipient was Harry B. Knowlton in 1960.

William Hunt Eisenman was a founder-member of the Society, and when he died in 1958 he had been its first and only secretary for 40 years.

Mr. Eisenman concentrated his great abilities on the creation of services that would increase the importance of the ASM member to industry. He was acutely aware of the need for suitable recognition and communication of the practical aspects of metallurgy.

His capacity for vision and execution are exemplified by the imaginative National Headquarters structure of the Society which stands today at Metals Park, Ohio.

Mr. Eisenman was totally dedicated to the Society and its work, and in that connection set forth this creed: "To create and accomplish, we must have faith in the American Society for Metals as an instrumentality through which all of us, recognizing that the security and welfare of our civilization depend increasingly on the advancement of scientific knowledge, will have an opportunity to serve humanity, our industry, and our country".

try gets production rates and yields that would have been considered astounding back in 1931.

From 1935 to 1944, Mr. Bossert served in various metallurgical managerial capacities and in Alcoa's operating department. In 1944, he became chief metallurgist of the fabricating division, in charge of quality control and metallurgical development of all technical phases of Alcoa's fabricating operations.

Seven years later he was appointed assistant chief metallurgist of the operating department, which is concerned with all metal manufacturing operations from smelting to the fabricated product. In 1956, he became chief metallurgist of the operating department and a year later was named chief metallurgist of the company and, on Apr. 20, 1959, was elected vice-president in charge of research and development.

When asked for his advice to young men pursuing a career in engineering, Mr. Bossert stated: "If you are technically minded, do not neglect the liberal arts subjects in your education. Make a special point of learning how to use the English language in written reports, in speeches and in your everyday business activities".

Theodore W. Bossert

Born in Milwaukee, Wis., on July 1, 1897, he received his early education in Milwaukee University School and, in 1921, was graduated with a B.S. degree in chemical engineering from MIT, where his principal extracurricular activity was track. His speed in the 100 and 200-yd. dashes earned him the title of New England Intercollegiate champ during his sophomore and junior years at Tech.

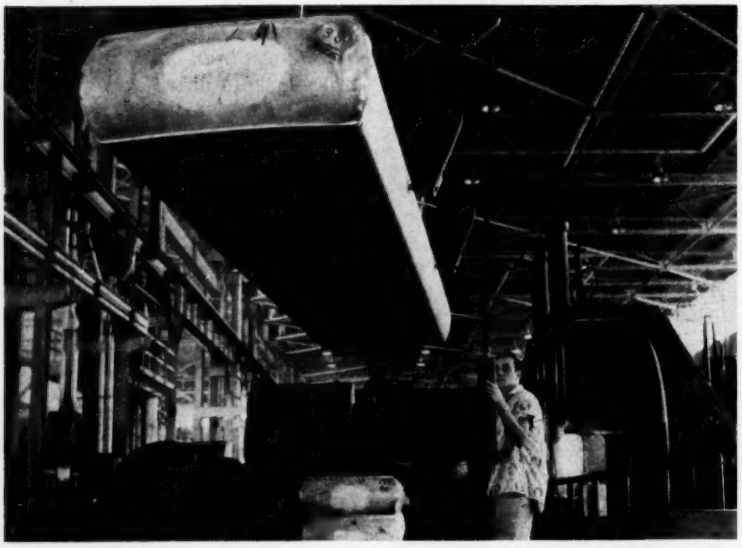
Mr. Bossert spent his summer vacations from college working on the production line at Allis-Chalmers Manufacturing Co.—earning 50¢ an hr. Before this, he recalls working as a machinist's helper for 10 hr. a day, 6 days a week, for 15¢ an hr. Following graduation from MIT, Mr. Bossert worked for Harley Davidson Motor Co., Milwaukee, as a design and test engineer, before joining Alcoa in 1923.

Mr. Bossert and his wife, the former Emily Stewart of Pittsburgh, have a son, Theodore W. Bossert, Jr., 21, a student at Hamilton College, Clinton, N.J., and two daughters, Mrs. Patricia Phillips, Redstone Arsenal, Ala., and Emily Carol Bossert, at home.

Mr. Bossert enjoys traveling and putters around the golf course, always conscious that "I like to golf, but I'm not a golfer".

He is a member of the First Presbyterian Church of Carnegie, Pa., Montour Heights and Chartiers Country Clubs and Pittsburgh's Duquesne Club and University Club. He is also a director of Aeroprojects, Inc., a company concerned with the development of industrial applications for ultrasonics.

Cast by the D.C. process, aluminum ingots weighing up to 12,000 lb. are rolled to plate and sheet in Alcoa's mills. Before World War II, the largest ingot available, cast by tilt mold process, weighed only 200 lb.



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Zak Machine Building

Zak Industries are building an additional 32,000 sq. ft. structure, to be completed this month, for Zak Machine Works, Inc., Green Island, Troy, N. Y. Construction is of structural steel framing with brick exterior walls in the office area and insulated color bonded steel siding in the manufacturing area.

Due to the scope of Zak operations as engineering manufacturers for industry, flexibility for handling in-process material as well as finished assemblies have been key noted into the plans. Because of efficient functional design of the new plant layout, additional operating economies will be realized to put Zak in a better competitive position and allow future expansion quickly and easily.

30,000 ASM Members and Friends Will Attend "Best Metal Show Yet"

Special Section 1961 Metal Show

More than 30,000 members and friends of the American Society for Metals are expected to visit the 1961 Detroit Metal Show, Oct. 23-27 in Cobo Hall. There they will have an opportunity to compare and evaluate the most advanced engineering materials and processes as presented in 250 exhibits and more than 200 technical papers. ASM has placed more emphasis than ever before on the educational aspects of the 43-year-old Metal Show with the "Materials Application Center" theme.

In the detailed development of the theme center it became apparent that its educational displays would embrace a broader scope than indicated by the original "materials comparison" terminology. "Materials Application Center" is believed to be more descriptive of the informative exhibit in store for visitors.

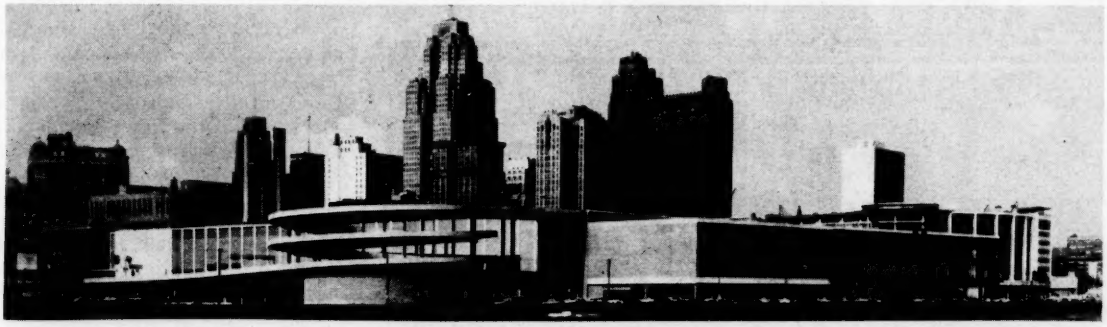
According to William J. Hilty, exposition manager of the Society, ASM has encouraged its exhibiting companies to staff their exhibits with engineering experts who are able to demonstrate new processes, answer specific technical questions and help solve the visitors' individual materials problems. The Metal Show, he said, is designed as an educational "short course" for metalworking executives, engineers, production, purchasing and sales personnel.

METAL SHOW THEME FEATURE—*The Materials Application Center, under the Metal Show "Quadrilon", will feature displays of seven groups of materials arranged by specific properties . . . an educational "first" which will demonstrate successful solutions to materials problems*

The show's educational theme will take shape in the form of a dramatic ASM Materials Application Center, a 12,000 sq.ft. exhibit area that presents seven groups of engineering materials for comparison as to more than six specific properties. Scores of sample parts, components and test specimens will be brought together under the 30-ft. arches of the Metal Show "Quadrilon".

Seven pavilions, one for each materials group, will radiate from the Quadrilon like spokes of a huge wheel. As visitors proceed through the pavilions, they will see what each materials group has to offer in specific properties to meet specific requirements. Each pavilion will be roofed with symbolic girders and will be color-coded.

Materials groups include Wrought Nonferrous, Wrought Ferrous, Cast Ferrous, Cast Nonferrous, Special Purpose, Nonmetallic and Composite. Properties categories are Strength, High-temperature, Corrosion Resistance (Atmospheric), Corrosion Resistance (Processing), Fatigue, Low-Temperature and General.



DYNAMIC DETROIT—*For the first time in ten years, ASM will bring its National Metal Show to this outstanding metalworking city, Oct. 23-27, 1961. Cobo Hall (foreground) will be the scene of all exhibits and most of the technical sessions, offering one-roof convenience to ASM members and guests*

Detroit Chapter Lends Enthusiastic Support

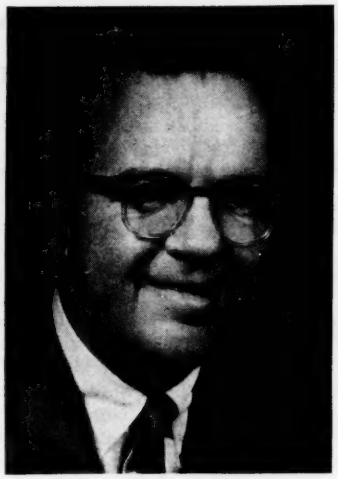
A king-sized convention committee of Detroit Chapter members of the American Society for Metals is providing enthusiastic cooperation with the Society's national headquarters staff to assure success of the 1961 Detroit Metal Show. Under the chairmanship of **Donald J. Henry,** the committee has been organized into 11 subcommittees planning and executing operations covering registration, attendance, housing, speakers, plant tours, coordination, banquet, hospitality, special events and ladies' entertainment.

Henry, a quietly energetic man, is assistant head of the metallurgical engineering department of General Motors' research laboratories. With him on the Detroit committee are **Robert Sergeson,** Jones & Laughlin Steel Corp., vice-chairman; **W. C. Morgan,** Penn Petroleum Corp., registration and reception; **G. Frederick Bush,** Ford Motor Co., cooperating societies; **W. P. Lewis,** Hamler Industries, attendance; and **Howard N. Bosworth,** Bosworth Steel Treating Corp., banquet.

Other committee members are **Robert B. Boswell,** Chrysler Corp., reception center and hospitality; **T. C. King,** Republic Steel Corp., plant visitation; **A. DiGiulio,** DiGiulio Foundry Co., speakers bureau; **George Bidigare,** Commercial Steel Treating Corp., science and vocational teachers; Phyllis LaBelle, ladies' entertainment; **Robert H. Shoemaker,** Kolene Corp., arrangements and **Richard A. Glinn,** University of Michigan, special events.

Each of the 11 convention subcommittees has from 10 to 150 Detroit ASM members in active working roles, all eager to uphold the reputation of the nation's second largest metalworking center. Henry has been working with T. C. DuMond, director of ASM Chapter Relations and manager of the Metal Congress, in organizing the comprehensive committee structure.

CONVENTION COMMITTEE, 1961 DETROIT METAL SHOW


Bud Guest

Bud Guest Is Featured Speaker at Awards Dinner

Bud Guest, popular broadcaster over Detroit radio station WJR, will be featured speaker at the ASM Awards Dinner, Monday evening, Oct. 23, at the Statler-Hilton Hotel, Detroit. The dinner will honor ASM's 117 chapters throughout the United States and Canada, with chairmen of most of the chapters present as special guests. Eight important metalworking awards of the Society, described elsewhere in this section, will be presented.

Bud Guest, who is the son of poet-philosopher Edgar A. Guest, is heard over WJR with "On the Sunny Side of the Street", "A Heap O' Livin'", "Guest House" and "The Best of Guest".

Bethlehem Steel Engineer Wins Young Authors Award

Roger L. Whiteley, supervisor of mechanical metallurgy in the Physical Metallurgy Division of Bethlehem Steel Co. will receive the first Marcus A. Grossmann Award for young technical authors. This is a counterpart of the Howe Medal, and is given to the most outstanding Transactions author under age 35.

The $2000 Bradley Stoughton Award for young teachers, winner to be announced, will be presented at the ASM Distinguished Service Luncheon, Friday, Oct. 27. Hundreds of Michigan student engineers will witness this presentation as guests of the ASM at the luncheon.

Gen. Schriever, America's Missile "Boss", to Keynote 1961 Detroit Metal Show

General Bernard A. Schriever, four-star "boss" of America's missile program, will deliver the keynote address at the 43rd Annual Banquet of the American Society for Metals, Thursday evening, Oct. 26. The Banquet will be a high point of the 1961 Detroit Metal Show, promising to attract upwards of 1000 ASM members.

Gen. Schriever's address will be of vital interest to everyone with an interest in materials and process engineering. The development of materials that will withstand the incredible temperatures and stresses of outer space are everyday problems to many ASM members. The General will speak with expert knowledge gained from experience as the guiding force behind our entire ICBM program. Under his direction, the Atlas, Titan, Thor and Minuteman missiles came into operational readiness.

He has been America's boss of push-button, retaliatory warfare since Apr. 1 of this year, when he assumed command of the newly established Air Force Systems Command, a unit composed of elements extracted from the Air Research and Development Command and the Air Material Command.

As the head of the complex AFSC, Schriever holds management responsibility over a dozen divisions and departments. Through his first-hand knowledge of the entire national aerospace effort, he will be able to supply the Detroit convention with facts, figures and projections, as well as current needs in the realm of processes and materials.

Since early 1950, when the U.S. space program was put into high gear, the AFSC has participated in almost every major advancement in space technology. Gen. Schriever has been associated with this national effort from the beginning, and he will come prepared to "talk turkey" to the assembled ASM engineers and scientists in Detroit. One of his major objectives, as the head of AFSC, is to coordinate the team efforts of science, industry and the military for the development of future aerospace systems.

Gen. Bernard A. Schriever

PLANNING A FUN-FILLED WEEK *at the Metal Show is the Ladies Entertainment Committee under the chairmanship of Mrs. Jack LaBelle. Highlights include morning coffee hours at the Statler, "Brain-Burnishing", a special "technical session" for the wives of ASM members, tours of Greenfield Village, Cranbrook Institutions, downtown Detroit and Cobo Hall, a luncheon at Devon Gables and tea with the ladies of the British Iron and Steel Institute. Meeting to select activities are, from left: Mrs. Donald Henry, Mrs. Robert Boswell, Mrs. LaBelle and Mrs. Allan Ray Putnam.*

"Steel" Category Adds to Materials Personality of 1961 Detroit Metal Show

More than 250 metalworking companies are expected to exhibit at the 1961 Detroit Metal Show, Oct. 23-27, in the Motor City's beautiful new Cobo Hall, according to William J. Hilty, ASM exposition manager. With each and every exhibitor qualifying under one or more of the 11 ASM metalworking categories, ASM members and friends will see one of the greatest concentrations of materials and process engineering companies in the 43-year history of the National Metal Exposition.

Hilty cited the "steel" category as an example of the cross-section of the metalworking industry in store for visitors. This basic industry is represented by such exhibitors as Allegheny Ludlum Steel Corp., Babcock & Wilcox Co., Copperweld Steel Co., International Nickel Co., Jones & Laughlin Steel Corp., LaSalle Steel Corp., McLouth Steel Corp., National Steel Corp., Republic Steel Corp., Sharon Steel Corp., Superior Tube Co., Ulbrich Stainless Steels, Inc., U. S. Steel Corp., Vanadium-Alloys Steel Co., and Youngstown Sheet & Tube Co.

ASM to Recognize Metalworking Achievement at Detroit Awards Dinner and Annual Banquet

Chairmen and representatives of most of ASM's 117 chapters will be special guests of the Society Monday evening, Oct. 23, as six major metalworking awards are presented at the ASM Awards Dinner, "opening night" event of the Detroit Metal Show. Eight additional awards will be given at other special events during Metal Show Week, Oct. 23-27. This will be the largest awards program in the history of the Society, and represents a continuing effort by ASM to encourage technological advances in materials and process engineering.

Humphrey

Bossert

George M. Humphrey Distinguished Life Member

George M. Humphrey, chairman of the Executive Committee and director of National Steel Corp., will be awarded the Distinguished Life Membership in the Society. The former Secretary of the Treasury will be honored for his outstanding contributions as an industrial leader to the progress of the metalworking industry.

This year's William Hunt Eisenman Award for engineering achievement goes to T. W. Bossert, vice-president, research and development, for Aluminum Co. of America (see article, p. 5). Claude L. Clark, staff metallurgical engineer for Timken Roller Bearing Co., Canton, Ohio, will receive this year's Albert Sauveur Achievement Award *(Metals Review,* June).

Clark

Darken

Sir Charles Goodeve Distinguished Life Member

Six additional awards of the Society are scheduled for presentation at the 43rd ASM Annual Banquet, Thursday, Oct. 26. A second Distinguished Life Membership in the ASM will be presented to Sir Charles Goodeve, president of the Iron and Steel Institute, England. Seventy-five members of the Institute, on tour in the United States, will be guests of the ASM at the Banquet.

Dr. Smith to Receive 15th ASM Gold Medal

The 15th Gold Medalist of the ASM will be Cyril Stanley Smith, institute professor at Massachusetts Institute of Technology since June, 1961, after 15 years as professor of metallurgy at the University of Chicago. The Gold Medal recognizes outstanding metallurgical knowledge and great versatility in the application of science to metalworking, as well as exceptional ability in diagnosis and solution of diversified metallurgical problems.

Ford Scientists Share Howe Medal

Three Ford Motor Co. scientists will receive ASM's oldest award, the Henry Marion Howe Medal, granted for their joint authorship of the most outstanding ASM Transactions technical paper. They are Victor F. Zackay, assistant manager of the applied science department of Ford's Scientific Laboratory, Duane J. Schmatz, research engineer in the department, and John C. Shyne, who is now an assistant professor of metallurgy at Stanford University.

Still to be announced are winners of two other awards to be presented at the Awards Dinner: The Albert Easton White Award will be given to a teacher of metallurgy, materials engineering or related sciences who has earned a long-standing reputation for outstanding ability. The Francis F. Lucas Metallographic Award is for the most outstanding entry in this year's metallographic competition, and will not be announced until Metal Show Week.

Lawrence Darken, associate director of U.S. Steel's Edgar C. Bain Laboratory for Fundamental Research, will present the ASM Campbell Memorial Lecture *(Metals Review,* July).

Zackay

Schmatz

Shyne

Research Medal to Alvin J. Herzig

The 1961 ASM Medal for the Advancement of Research will be awarded to Alvin J. Herzig, president, Climax Molybdenum Co. of Michigan, a division of American Metal Climax, Inc., and vice-president, American Metal Climax, Inc. This award is presented to a metalworking industrial leader who has shown unusual foresight and leadership in advancing the cause of research.

Smith

Herzig

TECHNICAL PROGRAM

43rd National Metal Congress and Exposition

In addition to ASM's extensive program this year, the engineering and scientific sessions of the Congress will include the programs of nine participating societies. A four-day metals engineering program will offer sessions on corrosion of automotive parts, new metal removal techniques, nonmetallic materials and light metals. The Seminar this year will explore in detail the important subject of ultra-high-purity metals; ASM's five-day scientific program will range in subject matter from structure and properties of steel to nuclear and space-age metals.

The Metallurgical Society of AIME is planning a full program, featuring sessions on "Breakdown of Cast Structures" and "Continuous Casting". The Society for Nondestructive Testing will present a comprehensive five-day program covering radiographic, electrical and magnetic techniques, as well as applications for nondestructive testing in military ordnance and in research. The American Welding Society will cover new welding processes and review gas-shielded welding.

The Metal Treating Institute will have a panel discussion "Can Your Costs Be Reduced by Brazing Techniques" and the Ultrasonic Manufacturers Association will discuss ultrasonics in cleaning and machining operations. A newcomer to the Congress, the American Gas Association, is sponsoring "New Equipment and Techniques in Melting and Heat Treatment" and a symposium presented by the Metal Powder Industries Federation—which includes papers on corrosion resistant powder metallurgy parts and plastic impregnation—should prove most interesting. As part of the Special Libraries Association program, a series of talks on "Development of Metals in Automobiles" will be presented.

All technical sessions will be held in Cobo Hall, except AIME sessions which are scheduled for the Pick-Fort Shelby Hotel.

Program

Saturday and Sunday Oct. 21 and 22

ASM Seminar: Ultra-High Purity Metals

Sat. 9:00 a.m.

Chairman: W. C. Ellis, Bell Telephone Laboratories

Why Ultra-Pure Metals? . . . W. G. Pfann, Bell Telephone Laboratories

Ion Exchange Methods for Obtaining Pure Metals . . . F. H. Spedding and J. E. Powell, Iowa State University

Pure Metals From Chemical Processes . . . H. A. Wilhelm and David Peterson, Iowa State University

Sat. 2:00 p.m.

Chairman: W. D. Robertson, Yale University

Electrolytic Preparation of Pure Metals . . . D. H. Baker and T. A. Henrie, U. S. Bureau of Mines

Purification by Zone Melting and Very-High-Temperature Melting Techniques . . . J. H. Wernick, Bell Telephone Laboratories

Analysis for Trace Elements . . . Ph. Albert, Vitry Laboratories, Paris

Sun. 9:00 a.m.

Chairman: W. R. Hibbard, Jr., General Electric Co.

Mechanical Properties of High-Purity Metals . . . R. L. Smith and A. A. Hendrickson, Michigan Tech

Some Annealing Phenomena in Ultra-High-Purity Metals . . . K. T. Aust and J. W. Rutter, General Electric

Metallographic Problems Resolved by Using Metals of Very High Purity . . . G. Chaudron, Vitry Labs., Paris

Sun. 2:00 p.m.

Chairman: F. L. Vogel, RCA

Effect of Trace Impurities on Electrical Properties . . . J. E. Kunzler, Bell Telephone Laboratories

Effect of Trace Impurities on Thermoelectric Properties . . . W. P. Pearson, National Research Council, Canada

Electromagnetic Properties of High-Purity Metals . . . W. A. Harrison, General Electric Co.

Monday, Oct. 23

9:00 a.m.

ASM Metals Engineering Program: Corrosion of Sheet Steels—I

Chairman: R. B. Kropf, International Nickel Co.

Materials for Anti-Smog Devices . . . F. L. LaQue, J. J. Moran and E. N. Skinner, International Nickel Co.

Evaluation of Materials for Automotive Exhaust Systems . . . L. H. Boguski, Republic Steel Corp.

Corrosion Properties of Low-Alloy, High-Tensile Steels . . . S. K. Coburn, U. S. Steel Corp.

ASM Transactions: Mechanical Properties of Steels

AIME: Processing of Refractory Metals—I; Theory of Work Hardening; Effects of Surface and Environment on Strength—I; High-Purity Iron and Its Dilute Solid Solutions—I

SNT: Educational Survey

2:00 p.m.

ASM Engineering: Corrosion of Sheet Steels—II

Chairman: F. Bens, Climax Molybdenum

Corrosion in Action (Film) . . . International Nickel Co.

Galvanized Steel for Automotive Use . . . J. C. Widman, Ford Motor Co.

Paint Systems for Corrosion Protection . . . N. Price and C. C. Durbin, Chrysler Corp.

ASM Transactions: Steels

AIME: Processing of Refractory Metals—II: Dislocations and Their Interactions; Effects of Surface and Environment on Strength — II; High-Purity Iron and Its Dilute Solid Solutions—II.

SNT: Educational Survey

Special ASM Program — Vacuum Techniques in Metallurgy

Vacuum Processing Theory . . . H. W. Westeren, C. I. Hayes, Inc.

Vacuum Theory and Applications . . . C. Norndorf, Consolidated Vacuum Corp.

Vacuum Furnace Instrumentation and Controls . . . P. Webster, Minneapolis-Honeywell Regulator Co.

Vacuum Furnace Practice . . . R. Korf, Woodward Governor Co.

Evening

ASM Chapter Chairmen's Dinner

Tuesday, Oct. 24

9:00 a.m.

ASM Engineering: Cold Forming of Metals—I

Chairman: R. Sergeson, Jones & Laughlin

Shear Spinning of Refractory Materials . . . P. P. Crimmins and C. W. Heimlich, Aerojet-General Corp.

Shear Forming of Tungsten Rocket Nozzles . . . J. E. Japka, General Electric Co.

Cold Forming of Stainless Steel . . . G. Vacek, H. M. Harper Co.

Hot Forming of High-Strength Steels . . . R. Blom, Ladish Co.

ASM Transactions: Carbides in Steels

AIME: Titanium in 1975—I; Continuous Casting; Effect of Surface and Environment on Strength — III; Physical Metallurgy of Refractory Metals—I.

Industrial Heating Equipment Assoc.: Industrial Oven Applications in Metal Processing

Metal Processing . . . J. W. Cornelius, DeVilbiss Co.

Continuous Galvanizing . . . F. Sandborn, Industrial Ovens, Inc.

Coating Continuous Strip . . . A. S. Dawe, J. O. Ross Engineering

Heat Treating Aluminum . . . A. J. Snow, W. S. Rockwell Co.

Ovens in the Foundry . . . C. H. Barnett, Foundry Equipment Co.

2:00 p.m.

ASM Engineering: Cold Forming of Metals—II

Chairman: H. N. Bogart, Ford Motor

Cold Forming (Film) . . . National Machine Co.

Steels for Cold Forming . . . J. V. Russell, Republic Steel Corp.

Lubrication for Cold Forming . . . R. W. Perry, Parker Rust Proof Co.

Cold Forming Practices . . . A. Braun, Braun Engineering Co.

ASM Transactions: Iron-Chromium Alloys

American Gas Assoc.: New Equipment and Techniques in Melting and Heat Treatment

Solving Heat Transfer Problems by Thermolog . . . R. LaNeay, Selas Corp.

Convection—Its Purposes and Principles . . . J. Huebler, Surface Combustion

AIME: Titanium in 1975—II; Working of Cast Structures; Vacuum Techniques in Metallurgy—I; Physical Metallurgy of Refractory Metals—II.

SNT: Mehl Lecture—The Need to Know . . . C. H. Hastings, Avco Corp.

Wednesday, Oct. 25

9:00 a.m.

ASM Annual Meeting and Campbell Memorial Lecture, by Lawrence Darken, Associate Director, Edgar C. Bain Laboratory for Fundamental Research, U. S. Steel Corp.

AIME: Nuclear Fuel Reprocessing—I; Work Hardening and Strengthening Mechanisms; Vacuum Techniques in Metallurgy—II; Oxidation and Corrosion.

SNT: New Applications of Radiographic Techniques; Nondestructive Testing in the Utilities Industry

2:00 p.m.

ASM Engineering: Unusual Metal Removal Techniques

Chairman: D. G. McCullough, General Motors Corp.

Chemical Milling . . . G .H. Fox, Jr., Turco Products

Electrolytic Metal Removal Processes . . . L. A. Williams, Anocut Engineering

Ultrasonic Machining . . . (Speaker to be announced)

Electrical Discharge Machining . . . D. H. Hill, General Motors Co.

ASM Transactions: Nuclear Metals; Plastic Deformation

AIME: Nuclear Fuel Reprocessing—II; Diffusion; Phase Relationships and Thermodynamics; Deformation—I

SNT: Electrical and Magnetic Techniques; Nondestructive Testing in Utilities Industry

Metal Powder Industries Federation: Powder Metallurgy Symposium

Corrosion Resistant Powder Metallurgy Parts . . . S. Bradbury, Hoeganaes Sponge Iron Corp.

Plastic Impregnation of Powder Metallurgy Parts . . . N. B. Newcomb, National Sinter-Seal Co.

Pre-Alloyed Fe-Ni Powders . . . N. I. Ananthanarayanan, Univ. of Kansas

High-Temperature Densification of Mo-UO_2 Powders . . . D. Murphy, R. Kirby, G. Hanks and J. Taub, Los Alamos Scientific Lab.

Application of PMPMA Materials Standard and Specifications Guide . . . P. J. Failla, Johnson Bronze Co.

Thursday, Oct. 26

9:00 a.m.

ASM Engineering: Nonmetallic Materials

Chairman: J. Young, DuPont Co.

Economics of Plastic Moldings vs. Metal Die Castings . . . G. L. Graf, DuPont Co.

Composition and Properties of High-Strength Adhesives . . . G. A. Jlkka, General Motors Corp.

Fusion Bonding—New Method for Combining Plastic and Metal . . . W. R. Pascoe, Polymer Corp.

Newer Plastic Materials—Effect on Metals Industry . . . H. McCann, Modern Plastics Magazine

ASM Transactions: Physical Metallurgy; Space-Age Metals—I

AIME: Deformation — II; Phase Transformations and Pressure Effects; Surfaces; Recrystallization, Grain Growth and Textures

SNT: Transportation and Nondestructive Testing

Metal Treating Institute—

Panel: Can Your Costs be Reduced by Brazing Techniques?

Moderator: R. F. Gunow, Vac-Hyd Processing Corp.

Hydrogen Brazing of Prototype Stainless Steel Fuel Elements for N.S. Savannah . . . D. C. Dilley, Ferrotherm

Vacuum Furnace Brazing of Stainless Steels . . . T. H. Crane, Kinetics Corp.

Furnace Brazing of Steel Parts With Dissociated Ammonia . . . R. L. Evans, Syracuse Heat Treating Corp.

Vacuum Brazing of Aircraft Alloys . . . N. K. Koebel and C. H. Ulbrich, Lindberg Engineering Co.

Salt Bath Brazing of Aluminum . . . F. J. Fahrendorf, Handy and Harman

Brazing Ferrous Alloys to Aluminum . . . R. Seal and D. W. MacVicar, Bi-Braze Corp.

American Welding Society: New Welding Processes

Electro-Slag Welding . . . W. H. Wooding, Arcos Corp.

Applications of Electron-Beam Welding . . . E. A. Franco-Ferreira, Oak Ridge National Lab

Developments in Friction Welding . . . M. B. Hollander, American Machine & Foundry

2:00 p.m.

ASM Engineering: Light Metals

Chairman: F. Bayer, Chevrolet Div.

Magnesium and Automobiles . . . F. L. Burkett, Dow Chemical Co.

Creativity With Aluminum and New Aluminum Applications . . . E. J. deRidder, Reynolds Metals Co.

Beryllium—A Space Age Metal . . . T. J. Hughel, General Motors Corp.

ASM Transactions: Space-Age Metals—II; Corrosion

AIME: Solidification; Precipitation and Aging; Structure and Properties; Powder Metallurgy and Processing of Metals

SNT: Nondestructive Testing at Enrico Fermi Power Reactor

American Welding Society: Gas-Shielded Welding Processes

Introduction to Gas-Shielded Metal-Arc Welding . . . P. J. Rieppel, Battelle Memorial Institute

Modern Uses of CO_2 in Gas-Shielded Arc Welding . . . W. B. Blackburn, International Harvester Co.

Gas-Shielded Arc-Spot and Shorting-Arc Welding . . . T. W. Shearer, Fisher Body Div.

Ultrasonic Manufacturers Assoc.: Developments in Ultrasonic Cleaning, Machining, Joining, and Inspection

Transducer Design for Sonic Cleaning Systems . . . L. J. Lyons, Bendix Corp.

Ultrasonic Cleaning and Inspection of Strip . . . H. F. Osterman, Branson Instruments, Inc.

Ultrasonics for Machining . . . G. C. Brown and J. N. Behm, Sheffield Corp.

A New Way to Measure Ultrasonic Cavitation . . . R. E. Heim, Westinghouse Electric Corp. and H. M. Goldsmith, Turco Products

Special Libraries Association—Metals Division

Chairman: E. B. Gibson, Carrier Corp.

Microstructure and Material Properties . . . C. W. Phillips, Ford Motor Co.

A Metallurgist's View of the Automobile . . . J. Holsworth, General Motors

Reliable Metals for Reliable Cars . . . R. Smith, A-C Spark Plug Div.

Evening

ASM Annual Banquet

Friday, Oct. 27

9:00 a.m.

ASM Special Session: Economies of Literature Searching in Research and Engineering

Viewpoint of the Scientist . . . R. J. Howerton, University of California

Viewpoint of the Engineer . . . (Speaker to be announced)

Problems of the Patent Office . . . D. Ladd, Commissioner of Patents

Government Responsibilities . . . G. G. Abdian, National Science Foundation

ASM Young Engineers Day

SNT: Ultrasonic Research and Standards

Noon

ASM Distinguished Service Luncheon

2:00 p.m.

SNT: General Application of Nondestructive Testing

SLA-Metals Division

Tour of Ford Motor Co.'s "Hurricane Road" Wind Tunnel and Vehicle Testing Area

Transactions Committee Defines Requirements for Technical Notes

By T. E. Leontis
Chairman, Transactions Committee

With the announcement that will appear in the September issue of *Transactions Quarterly* that papers are now invited for its new feature, Technical Notes, the Transactions Committee has completed another step in its plan to increase the usefulness of that journal. Although the need for a medium for short papers in scientific subjects had been recognized for some time, the magnitude of the need was not fully known until the findings of a subcommittee were reported to the Committee at its last meeting. The findings of the survey indicated an overwhelmingly enthusiastic endorsement of a publication medium for the category of papers designated as Technical Notes. Equally encouraging was the number of such contributions that the scientific installations contacted in the survey anticipated they would submit over a period of a year, the number ranging from a low of two to a high of nine per respondent.

The selection for publication of the papers submitted as Technical Notes will be governed by their adherence to the requirements outlined below:

Transactions Technical Notes

The Technical Note is defined as technical information of a specific nature too limited in scope or quantity to be classified as a paper. The topics should be of interest to the same class of readers as the present *Transactions*. The quality of the data and the writing should be equal to those of a technical paper.

The information presented could cover new methods and techniques, special designs of equipment, concise original theoretical treatments of a problem (not speculation) and physical property measurements or engineering results which do not require discussion. Negative results are not excluded, but preliminary results of a program, incomplete research or inconclusive results are not acceptable material. Each note must stand on its own merits regarding subject matter, conciseness and clarity of expression, pertinence of the topic to current or probable future significance in the science of metallurgy, and the importance of disseminating the information.

The Technical Note should be not greater than 1200 words in length and illustrations and tables should not require more than a full page of Transactions. The review procedure will be similar to the present one for technical papers. Any discussion of the note should appear in the form of another note.

It should be emphasized that a Technical Note is not to consist of a progress report on an incompleted piece of research or of inconclusive results from research. Each Technical Note should contain information of lasting significance and value to other scientists and to industry, and—to be of maximum usefulness—it should not only be complete in itself but be "packed" with information. Thus, although the 1200-word limit is ample for the intended purpose, it does not allow space for a leisurely dissertation: the paper will have to be clear, concise and limited to pertinent information only. The same high standards of publication will be maintained in Technical Notes by subjecting them to the same review procedures as are given to Technical Papers. We are sure that the enthusiasm for the idea of Technical Notes that was expressed to our subcommittee will be confirmed by the receipt of a steady flow of Technical Notes to enable their appearance in every issue of *Transactions Quarterly*.

This new feature will be identified by the banner head reproduced on this page.

Since the initial announcement in the March issue of *Metals Review*, two issues of the *Transactions Quarterly* have been published and distributed to its subscribers. We are confident that all who are receiving this outstanding journal are pleased and impressed by its technical content and good readability. The staff at ASM Headquarters, and in particular John Parina, editor of the *Transactions Quarterly*, have done an exceptional job in setting the format of this journal and in maintaining a very tight publication schedule. The Transactions Committee is very appreciative of the cooperation offered by the Headquarter's staff, the Technical Council and the Board in making this Quarterly possible.

A very important aspect of the publication of the *Transactions Quarterly* is the speed with which technical papers are being published. For example, the June issue consists largely of papers reviewed and accepted by the Committee at its February meeting. The September issue is, of course, the "big" issue; it will contain the majority

of the papers to be presented at the National Metals Congress in Detroit during the week of Oct. 23, 1961. The December issue will carry the Campbell Memorial Lecture, the Annual Report of the Society, discussions to all papers published during 1961 and the annual index.

As stated in the original announcement in March, the Committee—with the help of the editorial staff and, of course, the printer—will make every effort to hold the lag between acceptance and publication to a maximum of six months. All this is in keeping with the primary objectives of ASM to make available to industry the results of scientific investigations as rapidly as possible. The procedures for handling technical papers during the last 15 years resulted in as long a delay as 20 months between the time a paper was submitted and the time it appeared in the bound volume of *Transactions*. Such slowness is inconsistent with the speed with which technological progress is being made in the world we live in today.

We hope that our present publication schedule will induce more metallurgical scientists to submit their papers to ASM for publication. We urge all ASM members to promote the *Transactions Quarterly* as an outstanding metallurgical journal among metallurgists who are not ASM members. This can be done at national and local meetings, at university campuses, and during visits to various metallurgical laboratories around the country and abroad.

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Uses of Literature Searching Subject of Congress Session

A problem of vital concern to industry today will be highlighted during the National Metal Congress in Detroit in a session sponsored by the American Society for Metals. Subject of the session is "Economies in Research and Engineering Through Engineering Literature Searching", and discussion will be directed toward the entire area of information retrieval, with emphasis on costs and economics. The program is as follows:

Viewpoint of the Scientist, by Robert J. Howerton, Physicist, University of California, Lawrence Radiation Laboratory

Viewpoint of the Engineer, by Don C. Hilty, Assistant Director of Development, Technology Dept., Union Carbide Metals Co.

Problems of the Patent Office, by David Ladd, Commissioner of Patents

Government Responsibilities, by Gregory Abdian, Program Director, Research Data and Information Services, Office of Science Information Service, National Science Foundation.

The importance of this problem today has been emphasized on many fronts. For example, articles on the subject have been published in *Fortune* for September 1960 ("How to Cope With Information") and in *Business Week* for July 8, 1961 ("Machines Take Toil Out of Searching Files").

The first two speakers have given much thought to the problems faced by the scientist and engineer in finding information rapidly, effectively and cheaply, and are excellently qualified to summarize the situation facing those who work directly with technical literature.

It has been said that the U. S. Patent Office is literally engaged in a life and death struggle with an impenetrable and engulfing body of words. Commissioner Ladd will summarize the difficulties and expenses now being encountered in making patent searches, and outline the research necessary to speed up patent applications.

Senator Humphrey aptly pinpointed the urgency of the information problem when he said "The man in space program provides a crucial illustration of an activity which cannot wait for methods of information management which might have been adequate in the year 1910. This program's entire pace and success depend upon mastery of up to the minute classified and nonclassified information".

Mr. Abian will tell what is being done in the fairly new but highly effective Office of Science Information of the National Science Foundation. He will describe the efforts of this body to coordinate the operations of information services for better efficiency and economy.

The meeting will be held in Cobo Hall, Detroit, at 9:30 a.m., on Friday, Oct. 27. It is open to anyone attending the Metal Congress or anyone who is interested in this extremely important problem.

Technical Papers Invited for ASM TRANSACTIONS

The ASM Transactions Committee is now receiving technical papers for consideration for publication in the Society's Transactions Quarterly for March 1962.

Many of the papers accepted by the Committee will be scheduled for presentation at the 44th National Metal Congress and Exposition; however, publication of a paper does not necessarily infer that it will be presented at the Society's Convention.

Manuscripts in triplicate, plus one set of unmounted original photographs and original tracings should be sent to the attention of John Parina, Secretary, Transactions Committee, American Society for Metals, Metals Park, Ohio. Detailed instructions for preparation of papers for Transactions Quarterly are available on request.

Transactions Quarterly is available to ASM members at an annual subscription rate of $3 (non-member subscription rate $10 per year).

ASM Regional Exhibit and Conference Scheduled for Houston Next April

A new concept in service to members and industry will be introduced in Houston, Tex., next Apr. 17, 18 and 19 by ASM with a Regional Conference and Exhibition. Both the Conference and Exhibit are designed to tie in closely with the industry of that area. As a result of conferences with local industrial leaders and with members of the Texas Chapter ASM, the theme of the event will be "Materials and Materials Processing for the Petroleum, Petrochemical and Chemical Industries".

The Conference and Exhibit will be staged at the Shamrock-Hilton Hotel which features a large exhibition hall adjacent to the hotel proper.

From a schedule point of view, the Houston event will take the place of the Southwestern Metal Show which has been held previously in Dallas.

Both the Conference and Exhibit will run a full three days. Technical sessions will be held in the hotel, just a short distance from the exhibition area.

Strong co-operation is being given on all details of the affair, including planning the program and sale of exhibit space by special committees of the Texas Chapter, in Houston, headed by Lamar J. Vieau, chapter chairman.

From an educational point of view, the program is being planned to assist industries in the Gulf Coast area with specific information on materials problems pertinent to these industries and the area itself. Likewise, exhibits are to be restricted to those which originate from local industry, distributors, agents and representatives operating in the Houston area, and service companies and national organizations seeking to establish operations in the region.

On the basis of the first announcement of the Conference and Exhibit, more than 30 organizations requested space. Many others have since indicated their desire to participate. Approximately 150 organizations are expected to take space.

An attendance of more than 10,000 is anticipated, representing industry in Texas, Arkansas, Oklahoma, New Mexico and Louisiana.

Lamar J. Vieau

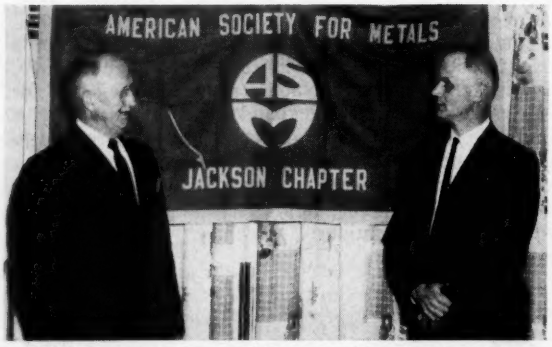
The technical program, details of which are to be announced soon, will place strong emphasis on the practical and engineering aspects of materials used in the three large industries. Sessions are being planned on materials selection, corrosion problems and joining techniques.

BOSTON EXECUTIVE COMMITTEE *for the 1961-1962 season consists of, seated, from left: Robert Trainor, assistant secretary; Steven G. Demirjian, vice-chairman; Harrison I. Dixon, chairman; John D. Paine, Jr., secretary-treasurer; and Daniel A. Black, program. Standing, from left, are: Marc Richman, Gerald F. Buckert, Walter A. Backofen, education, William H. McCarty, past-chairman, James L. Martin, past chairman, Samuel Valencia, George Underwood, William R. Collins, past chairman, George Langford, Alexander F. Sherys and George Nereo*

Chapter Prints

Russel Brush, chairman, W. A. Black, assistant director of research, Republic Steel Corp., who discussed "Nondestructive Testing", and Robert Barrow, vice-chairman, shown at a meeting held by the Rochester Chapter

Daniel Leickhardt, Brooklyn Polytechnic Chairman, presents ASM Scholarship to Joel Hirschhorn, metallurgy student. From left are: Mr. Leickhardt, C. T. Oergel, professor, V. Franceschini, supervisor, and Joel Hirschhorn



National President William A. Pennington, who discussed "Mild Steel in Corrosion Service", and W. C. Truckmiller, chairman of the Jackson Chapter, shown during National Officers Night meeting

Special Grinding Techniques were discussed by Leo P. Tarasov, research associate, Norton Co., at a Worcester meeting. He is shown, center, with F. E. Kennedy, vice-chairman, and H. J. Holmes, chairman

James L. Beaton, Robert Hoffman, sophomore metallurgy student at University of Notre Dame to whom an ASM scholarship was awarded, and E. A. Peretti, head of the metallurgy department, at a Notre Dame meeting

Past President John Chipman shown presenting the Sauveur Memorial Award of the Boston Chapter to Bruce Chalmers, Gordon McKay Professor at Harvard University. Dr. Chalmers spoke on "Structure of Grain Boundaries"

Indiana Chapters' Vacuum Metallurgy Symposium

"Vacuum Metallurgy" was the subject of the 13th annual symposium of the **Indiana** Chapters held at Purdue University. Chapters participating were Calumet, Fort Wayne, Indianapolis, Muncie, Notre Dame, Purdue and Terre Haute.

Harry Hamjian, manager of manufacturing, Metals Div., Kelsey-Hayes Co., pointed out that his company was able to salvage 6 million lb. of air-melted Waspalloy by remelting in vacuum (10 microns) to meet specification requirements. The melt is refined by a deoxidizing process in which the volatile gases and tramp elements are oxidized and pumped off. Controlled additions of aluminum, titanium and boron are made and samples removed through air locks for spectrographic analysis and stress-rupture tests. The final heat (5000 lb.) is poured under vacuum into an ingot mold or centrifugal casting.

Vacuum melting of other alloys—AMS 6434, SAE 4330, 52100 and Tricent—is improved by reducing the low-melting elements, such as As, Sb, Sn and Cd, which improves stress-rupture strength and increases tensile and yield strengths.

In a talk on "Properties of Consumable Electrode Vacuum Melted Steels", W. W. Dyrkacz, manager of quality, Allegheny Ludlum Steel Corp., stated that the consumable electrode vacuum melt process has developed since the Korean War to a present annual capacity of 100 million lb. He described the process, pointing out that present electrode diameters are 12 to 35 in., with a 50-in., 50,000-lb. ingot expected. Improved mechanical properties, hot and cold workability, less segregation, decreased gas entrapment with improved soundness, uniform hardness across the ingot and reproducibility result from consumable electrode vacuum melting.

"Functional Surfaces by Vacuum Metallizing" were covered by P. J. Clough, director, metallized products program, National Research Corp. One of the first vacuum processes to become commercially available, vacuum metallizing is used to produce brilliant metallic surfaces on nonmetallic bodies and die castings for decorative effect. The coating is electrically conductive and has no corrosion or abrasion resistance. Later developments resulted in coatings with corrosion and abrasion resistance which could be anodized and retain the decorative advantage of thin coats. Clean parts are placed in a vacuum system mounted so all surfaces are exposed to radiating metal vapor. When aluminum is evaporated, residual pressure is one micron Hg—and temperature is approximately 1350° C.

Principals at the annual symposium held by the combined Indiana Chapters included, front, from left: Harry Hamjian, Metals Div., Kelsey-Hayes Co., W. W. Dyrkacz, Allegheny Ludlum Steel Corp., Phillip J. Clough, National Research Corp., and James H. Moore, NRC Equipment Corp., and in rear, George F. Sommer, Indianapolis chairman, T. C. DuMond, moderator, and T. H. Carlson, Indianapolis symposium committee chairman

The aircraft industry uses the process to coat high-tensile steel (for structural parts and surface skins) since it has low resistance to corrosion. Organic coatings are temperature limited and electroplated surfaces are subject to embrittlement.

Vacuum depositing of thick films of cadmium, ¼ to 1 mil, results in excellent adhesion and corrosion resistance but the coatings are soft and have little abrasion resistance.

Aluminum can be applied to complex shapes and the deposited metal, which is extremely pure, can be anodized and dyed, has excellent corrosion resistance and is ductile and adherent. Pure aluminum has been deposited on various grades of steel, from 1030 to high alloys such as H-11 or Vascojet 1000, and on alloys of aluminum, magnesium and titanium. Aluminum-coated steel has good tensile strength, fatigue limit and corrosion resistance. Rotating-beam fatigue tests of H-11 toolsteel show no decrease in fatigue limit up to 925° F. Above this temperature fatigue strength is reduced appreciably, due to diffusion of aluminum into steel, where brittle Fe-Al compounds are formed.

James H. Moore, vice-president, NRC Equipment Corp., presented a comprehensive survey of the use of vacuum techniques in degassing, induction and arc melting, distillation and reduction, evaporation coating, electron-beam melting and welding, heat treating and sintering and application of semiconductor films. The effect of vacuum consumable melting on various elements was demonstrated. Refinement by distillation, vacuum thermal reactions was also discussed.

Vacuum arc melting has mushroomed from a 1955 capacity of 22 million lb. to 250 million lb. Vacuum induction capacity in the same period increased from 5 to 30 million lb.; electron-beam vacuum melting has a present capacity of 10 million lb. Vacuum melting techniques have enabled titanium production to be increased from 300,000 lb. to 1,000,000 lb. per month.

In processing chromium alloys, a high-vacuum technique is necessary because of high melting temperature and high vapor pressure. The development of the jet engine promoted the use of vacuum consumable electrode melting of iron, nickel and cobalt-base alloys and increased the 100-hr. stress-rupture strength considerably. *(Reported by Raymond J. Thomas)*

MEN in METALS

Jesse Charles Johnson, director of the Division of Raw Materials of the Atomic Energy Commission, has been selected as the third recipient of the Ambrose Monell Medal for distinguished achievement in mineral technology. In addition to the gold medal, which was established at Columbia University in 1954, Mr. Johnson will receive the first Ambrose Monell Prize of $25,000 from the Ambrose Monell Foundation. Previous recipients of the medal are Lloyd M. Pidgeon, who made possible the economic production of magnesium metal, and Edgar C. Bain, for the development of steel alloys.

Donald F. Kittredge has been appointed assistant vice-president in the International Div. of National Malleable and Steel Casting Co. He was sales manager of the company's Transportation Products Div. office in New York.

Louis R. Larsen has been appointed sales engineer for the Beryllium Corp. He comes from the Carborundum Co. where he served for four years in the research division of marketing and sales.

W. B. Moen has been appointed manager of Air Reduction Sales Co.'s Cryogenic Engineering Dept., Plainfield, N.J. Associated with Airco since 1948, Moen has served as assistant engineer at the Research Laboratories, Murray Hill, N.J., as section head, Metallurgical Process Div. and later director of that division, and as engineering-manager for Airco's special products department.

William Driscoll has been appointed sales engineer for infrared-spectrochemical instruments for Baird-Atomic, Inc. He was previously associated with Nuclear-Chicago Corp. and Argonne National Laboratory.

Stanley W. Dublin, assistant to the director of the Engineering Research Div. at New York University, has been appointed research director and secretary of the Newark College of Engineering Research Foundation.

H. Richard Lewis, chief foundry metallurgist, Alleghany Ludlum Steel Corp., Buffalo, N.Y., foundry, has been appointed general manager of the Stainless Steel Div., Fort Pitt foundry, McKeesport, Pa.

The Washington Chapter presented the George Kimball Burgess Memorial Award for 1961 to Nathan E. Promisel in recognition of his "outstanding contributions to metallurgy through wise administration, encouragement of new developments and distinguished service on government advisory committees, and as chairman of the ASM Metals Handbook Committee."

The award is presented annually for outstanding contributions to the field of metallurgy by a member of the Washington Chapter. It is presented as a tribute to the memory of George Kimball Burgess (1874-1932), president ASM (1923), director, National Bureau of Standards (1923-1932). The citation presented to Mr. Promisel was signed by William A. Pennington as president ASM, and by Richard H. Raring, chairman of the Chapter.

Alloy Engineering & Casting Co. has promoted Frank J. Staral to vice-president in charge of sales and engineering. Mr. Staral has been with the company since 1943, originally as assistant chief engineer and later as Chicago district representative.

Robert S. Lynch, former chairman of Atlantic Steel Co. and presently executive vice-president of Ford-Lynch Associates, has been appointed general manager of Southern Iron & Equipment Co. He is a past chairman of the Atlanta Chapter ASM.

Joseph H. MacVeigh has retired after 42 years with the Pressed Steel Co., after having served for many years as vice-president and general manager of the firm. He joined the company after an association with United Gas and Electric Engineering Corp.

Roland P. Koehring, section engineer in charge of research at the Delco Moraine Div., General Motors Corp., was named a Powder Metallurgy Pioneer by the Metal Powder Industries Federation, at the 17th Annual Technical Meeting of the Federation, in recognition of the "significance of his pioneering contributions that have advanced the progress of powder metallurgy from a laboratory technique to an industrial technology during the period 1921-1961".

Frederick T. Hedgcock has been named manager of the magnetics and semiconductor laboratory of the Franklin Institute Laboratories. Dr. Hedgcock is former associate professor of physics at the University of Ottawa.

John T. Norton, professor in the department of metallurgy at Massachusetts Institute of Technology, received the Plansee Plaque awarded at the 4th International Plansee Seminar held in Reutte, Tirol, Austria. Dr. Norton is the first American to receive the plaque, which is given in recognition of fundamental contributions in the field of powder metallurgy.

Achorn Steel Co., Cambridge, Mass., has announced the following personnel promotions: Arthur S. Johnson was elected vice-president after 33 years' service, Edward H. Johnson was elected vice-president after 27 years of service, Fred C. Kenney, Jr., was elected manager of toolsteel sales after 16 years of service, and Donald Achorn was elected assistant to the president and general manager after 15 years of service.

William F. Aylard, formerly director of engineering, has been named a vice-president of Chase Brass & Copper Co. He will be responsible for the coordination of Chase's research, engineering and product development division.

C. Glen Bigelow, Jr., has been elected vice-president, research, for Selas Corp. of America. He joined Selas in 1958, coming from American Machine and Foundry Co. where he served as technical director of the general engineering laboratories.

American Hot Dip Galvanizers Association elected W. M. Boyles, president of the Boyles Galvanizing and Plating Co., president for the current year, T. R. Gregory, president of the Thomas Gregory Galvanizing Works, first vice-president, and Cooper Hawthorne, vice-president and general manager of Metals Services, Inc., second vice-president.

Donald J. Schwalm, metallurgist since 1949 at Holcroft & Co., has been named chief metallurgist for the company.

R. E. Moore, who has been assistant secretary since 1947, has been appointed secretary of the British Institute of Metals, to succeed Lt. Col. S. C. Guillan, who has retired after 50 years of service.

Christopher J. B. Fincham has been appointed technical director of the Metals Div., National Research Corp. Before joining NRC in 1956 he served as scientific officer with the British Iron and Steel Research Association, research associate at Columbia University and lecturer at the University of Toronto.

Ralph Lyle Lindner has been appointed vice-president, general manager, of the Precasco Corp., parent firm of the Precision Castings Co. He spent 22 years with the Light Metals Div., Thompson-Ramo-Wooldridge, and during the past four years was associated with Cloyes Gear and Products, Inc.

Obituaries

William P. Achbach, 38, a metallurgical consultant at Battelle Memorial Institute for eight years, died in Columbus on July 10. He was a member of the Columbus Chapter.

William K. Sproule, consulting metallurgist with the Development and Research Division, International Nickel Co., Inc., died in New York on Aug. 8 after a long illness. He was 48.

Mr. Sproule, a graduate of McGill University, had been associated with Inco since 1937.

Francis F. Lucas, 76, retired metallurgical scientist, engineer and inventor, died in June. A native of Glen Falls, N. Y., Dr. Lucas had been associated with Bell Telephone Laboratories from 1902 until his retirement to Winter Park, Fla., in 1949.

In 1957, the American Society for Metals established the Francis F. Lucas Award for Excellence in Metallography in Dr. Lucas' name (see *Metals Review*, September 1957).

ASM cited him as "a scientist of international renown and a pioneer in the development of high-power photography of metallurgical specimens."

For this initial work in metallography, Dr. Lucas was awarded the Henry Marion Howe Gold Medal of the Society in 1924.

"SIGNIFICANCE OF METAL WHISKERS *to the Development of High-Strength Steels" was pointed out by V. J. Zackay, Ford Motor Co., at a Cincinnati meeting. Shown are, from left: Lou Janke, General Electric Co., Walter Koshuba, chairman; Mr. Zackay; and John Halbig, Armco Steel Co.*

New Developments in Metal Removal

The present and future requirements of the space age require the machining of higher and higher strength material, with corresponding slower rates of metal removal and shorter tool life, according to Norman Zlatin, Metcut Research Associates, Inc., who spoke on "New Developments in Metal Removal" at a meeting in **Pittsburgh.**

In some conventional turning operations, metal removal rates have been increased and tool life considerably extended by the use of new tool materials such as aluminum oxide, titanium carbide and titanium boride. These materials are very useful for specialized jobs, but presently are somewhat erratic.

Mr. Zlating introduced six new concepts in metal removal, including chemical milling, the electrode discharge process, electrolytic machining, electrolytic grinding, the ultrasonic process and electron beam machining. Chemical milling involves metal removal by chemical solution, is not limited by size of the part and is of particular advantage for machining inaccessible areas and also achieving weight reduction.

In the electrode discharge process, metal eroded by a high-frequency spark is vaporized and washed away by a dielectric oil. This method, although slow, is adaptable for materials, such as tungsten carbide, which are difficult or impossible to machine by any other method.

Electroyltic machining and electrolytic grinding are similar in principle and are essentially deplating processes. The former is useful for drilling small-diameter holes of great length in high-temperature material and also for cavity sinking; the latter is employed in finish grinding such parts as carbide tools and honeycomb structures.

The ultrasonic process, in which metal removal is accomplished with abrasive particles driven onto the surface by a transducer activated by an alternating current, is slow but very accurate. It is used primarily for nonconductors, such as ceramic, and semiconductor material for which the aforementioned methods cannot be used.

In electron beam machining, a beam of electrons at very high voltage is condensed to a very narrow beam. This beam is then used in those applications in which the drilling of numerous extremely small holes in thin material is required.

The relative rates of metal removal from various materials by each of these methods were shown. For most common materials and applications, conventional machining methods are still the fastest and cheapest. However, each of the newer methods for metal removal has a specialized field of application for which conventional machining is too costly, impractical, or in some cases, impossible. *(Reported by William G. Fricke, Jr.)*

Temper Embrittlement

A review of "Temper Embrittlement" and a summary of recent work done in this field were presented at a **Detroit** meeting by Clarence A. Siebert, professor of metallurgical engineering, University of Michigan.

The first mention of this phenomena showed up in literature as early as 1833 and, since that time, methods have been found to combat this type of embrittlement but to date the basic cause had not been found.

Krupp Steel Co. of Germany was among the first to develop data concerning tempering temperatures at which embrittlement could be avoided. The embrittling effect results from tempering some hardened steels in the 850-1000°F. range and is evaluated by noting the shift in the ductile-to-brittle transition temperature resulting from the tempering treatment. An increase in the transition temperature indicates an embrittling effect. These brittle fractures normally occur at prior austenitic grain boundaries, or occasionally at ferrite boundaries, as contrasted to the fibrous-type fracture that occurs through the grain.

The transition temperature is evaluated by an impact test using Charpy V notched specimens. Dr. Siebert noted that the transition temperature has been defined in different ways by different investigators. Two common methods are to use the temperature at which the impact value drops below the 50 ft-lb. level or to use the 50% brittle fracture on a curve which rates the fracture from 100% brittle to 100% fibrous. To run tests in the embrittling 850-1000°F. range without encountering changes in hardness during the test period it is a common practice to heat the specimen to an austenitic state, quench to martensite and then temper at 1200-1250°F., followed by another quench. Impact tests are then run at varying temperatures on the specimen given this treatment so that the normal transition temperature can be determined. This is used as a base curve for this material. Tests are conducted in the embrittling temperature range and are evaluated by the impact test to determine whether or not the transition temperature has shifted.

A graph was used to illustrate that temper embrittlement is a time-temperature function. This graph has roughly the same appearance as the upper section or nose of a T-T-T curve. Starting out at a temperature at the low end of the embrittling range, an increase in transition temperature occurs as the time at this temperature is increased. At a slightly higher temperature level the same action occurs but in a greatly decreased period of time. A further increase in temperature beyond the "nose" of the curve makes the action slow down again.

A group of tests was also conducted to show that retempering a

Clarence A. Siebert

specimen at 1250°F. following the embrittling treatment restores the majority of the original impact properties, indicating that the process is reversible.

Other sets of data were presented to show that vacuum melting of steel results in a lack of temper embritttlement when phosphorous and other tramp elements are kept low. Tests have shown that in addition to phosphorous, antimony and arsenic also have a detrimental effect. Silicon, bismuth, zirconium and nitrogen were shown to have very little effect. Dr. Siebert showed electron microscope photomicrographs taken at 10,000 magnification in an attempt to detect the cause of temper embrittlement. All of these attempts failed to indicate a cause.

In another attempt to determine if carbon migration had an effect, a sample of 0.40% carbon steel was decarburized in moist hydrogen. It was then recarburized with radioactive C_{14}. Following this the sample was austenized, quenched, tempered at 1250°F., quenched and then embrittled at 850°. The sample was polished and subjected to an autoradiographic technique. This technique involved the exposure of a film against the face of a polished metallographic sample containing a radiographic carbon. The film was viewed in a microscope and was superimposed on the polished and etched sample to determine if any segregation of the radioactive carbon had occurred near the grain boundaries. No such condition was found to exist.

Most of this work was done on SAE 3140 and 5140 steel. To determine the effect of molybdenum, a series of tests was also run on SAE 4140 and 4340 steel. Attempts to embrittle these two steels by tempering at 900°F. for periods up to 1000 hr. showed no shift in the transition temperature, indicating a complete lack of susceptibility to temper embrittlement.

Dr. Siebert also pointed out that temper embrittlement is normally not encountered in plain carbon or plain nickel steels. The addition of chromium to a steel results in the return of the temper embrittlement phenomena and the addition of nickel and chromium intensifies the reaction.

Even though phosphorous has been found to have a detrimental effect, it seems to lose this effect in molybdenum-containing steels, possibly due to the formation of molybdenum phosphide. It was also noted that pure iron has a transition temperature but that it always has a transcrystalline structure. The temper embrittlement phenomena is characteristic of quenched and tempered steels and would not normally be encountered in "as rolled" or annealed material. *(Reported by G. M. Lahr)*

Texas Past Chairmen Honored

Fifteen of **Texas Chapter's** 22 past chairmen were guests of the Chapter at a recent meeting during which National President William A. Pennington spoke on "Diffusion and Transport of Carbon in Ferrous Metals". Present were R. W. Schlumpf, founder member and first chairman of the Chapter (1937-38), R. M. Garrisson (1939-40), F. M. Whitlinger (1943-44), Carl S. Cook (1944-45), Glenn R. Ingels (1946-47), K. P. Campbell (1947-48), Charles F. Lewis (1948-49), W. A. Kuenemann (1949-50), Harold W. Schmid (1950-51), H. C. Dill (1951-52), W. Mack Crook (1953-54), Donald E. Wilson (1955-56), Russell F. Goff (1956-57), Joe B. Marx (1958-59) and W. D. Gilder (1959-60). *(Reported by G. L. Schlief)*

Application of Impact Hammers to Forging Quality

Robert P. Daykin, research metallurgist, Ladish Co., presented a talk on "Application of Impact Hammers to Forging Quality" at a meeting in **Indianapolis.**

The effects of moving metal in forging are: closing of cavities or internal voids by welding; breaking up segregates; altering cast structure and related structural effects; and shaping metal to the desired geometry.

Studies show that impact toughness, endurance and rigidity are favorably increased by forging and improvement in ductility is greater in the longitudinal direction. Transverse ductility depends on cleanliness and homogeneity of the material being forged. If a metal is porous, increased forging reduction, closing the voids, improves transverse ductility. With metals of ultimate cleanliness — completely free from voids, inclusions or chemical segregation—forging has little effect on transverse ductility.

Confining metal in closed dies concentrates pressure and further enhances the effects of forging on properties. When steel is forged in "closed impression" dies, high pressures developed by impact on tightly enclosed metal improves ductility. When steel is forged in "open" dies, the only restraining forces are resistance of the hot, weak metal to the forces acting upon it and the friction between metal and die surfaces. Closed die forging produces denser material, through compression of microscopic or submicroscopic voids.

Forging develops useful properties by plastic deformation of the metal structure. The initial forge action involves mechanical fracturing of the coarse, cast grains. Further grain refinement is brought about by low-temperature straining of metal, with subsequent reheating. Forging is used to apply strain while concurrently shaping metal to useful forms.

Since temperature and amount of metal movement can alter properties substantially, uniform deformation is necessary to control these conditions. Light hammer blows tend to work surface metal without penetrating the center; heavy squeezes of a press tend to restrain surface movement through die chill and friction between metal and die. Hammers have an outstanding advantage in controlling deformation with their ability to avoid die chill, and to vary the intensity and number of blows.

Closed die hammer forging has proven particularly advantageous in shaping metal close to finished dimensions. Hammer forging produces geometry and properties superior to other methods because there is high energy release, the blow of the steam drop hammer is immediately withdrawn while presses remain in contact and withdraw heat from the piece.

These advantages depend largely on accurate control of pressure. The counterblow hammer has the further advantage of concentrating work in the metal being forged and not dissipating it in significant proportion to the ground and surrounding area.

Impact effects in closed dies produce unique property and structural effects. As greater knowledge of plastic deformation developes, new effects with familiar structural steels (such as "aus-forging" and cold straining) are producing heretofore uncontemplated high strengths and are resulting in stronger, lighter, more reliable structures and equipment. *(Reported by Dorothy Holbrook)*

Robert P. Daykin, John Kildsig and Carl Brandenberg at an Indianapolis meeting during which Mr. Daykin spoke on "Application of Impact Hammers to Forging Quality"

NEW BOOKS

Advances in Electron Tube Techniques. David Slater, Editor. Pergamon Press Ltd., Headington Hill Hall, Oxford, England.

Advances in X-Ray Analysis, Vol. 4. William M. Mueller, Editor. Plenum Press, 227 W. 17th St., New York 11, N. Y. $15.

Basic Materials for Electronics (Materiaux de Base Pour l'Electronique). Societe Generale des Minerais, 31 rue du Marais, Brussels 1, Belgium.

British and Foreign Specifications for Steel Castings. British Steel Castings Research Assoc., 5 E. Bank Rd., Sheffield 2, England. $7.50.

Chemical Crystallography, 2nd Edition. C. W. Bunn. Oxford University Press, 417 Fifth Ave., New York 16, N. Y. $12.

Crystallization. J. W. Mullin. Butterworths Inc., 7235 Wisconsin Ave., Washington 14, D.C. $11.

Engineered Castings. Glenn J. Cook. McGraw Hill, 330 W. 42nd St., New York 36, N.Y. $8.50.

For the Years to Come—a Story of International Nickel of Canada. J. F. Thompson and N. Beasley. G. P. Putnam's Sons, 210 Madison Ave., New York 16, N.Y. $5.

Grinding Stresses—Cause, Effect and Control. Collected Papers. Grinding Wheel Institute, 2130 Keith Bldg., Cleveland, Ohio.

Metallurgy of Semiconductors (Translation from the Russian.) Yu. M. Shaskov. Consultants Bureau, 227 W. 17th St., New York 11, N. Y.

Non-Crystalline Solids. V. D. Frechette, Editor. Conference on Non-Crystalline Solids, Alfred, N. Y., Sept. 3-5, 1958. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $15.

Nuclear Propulsion. M.W.Thring, Editor. Butterworths Inc., 7235 Wisconsin Ave., Washington 14, D.C. $9.50.

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METALLURGIST: Background in rolling of silver brazing alloys, clad metals in gold, silver, copper, Kovar, nickel, etc., wire drawing ability, to establish and supervise new department including set-up and quality control. Send resume. All replies confidential. Box 9-5.

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Midwest

TECHNICAL LIBRARIAN: Degree in Sciences, with interest in library work, or degree in library science with science courses or technical library experience. To assume responsibility for library services for industrial research laboratory in Detroit. Box 9-30.

West

PHYSICAL METALLURGIST: To handle metallurgical requirements in production of drawn and extruded aluminum tubing. B.S. in Met. Eng. required, with three or more years experience in tube manufacture, preferably aluminum. Immediate opening. Confidential. Write complete resume of training and experience to: Personnel Mgr., Reynolds Metals Co., P.O. Box 2289, Phoenix, Ariz.

POSITIONS WANTED

METALLURGICAL ENGINEER: M.S. with over nine years diversified experience in alloy development and materials application and thorough practical knowledge of high-temperature alloys, steels and nonferrous metals, desires responsible position of challenging nature. Age 38. Box 9-35.

METALLURGIST, GROUP LEADER: Age 26, family, B.S. degree. Five years research and development tool, die steels, high-strength alloys, hardenable stainless, high-temperature alloys. Full knowledge heat treating, mechanical testing, metallography, mill processes. Technical society speaker, customer service experience. Desires product development, mill metallurgical or technical service position. Resume on request. Box 9-40.

METALLURGICAL ENGINEER: M.S., age 35, married. Eleven years experience in corrosion lab, materials evaluation and ferrous production. Last five years as metallurgist for prominent forge shop. Desires responsible position in production or development. Resume on request. Box 9-45.

METALLURGIST: B.S. with 14 years experience in tool steel industry. Experienced in processing tool steels, stainless and high-temperature alloys, eight years as supervisor. Considerable customer contact experience. Desires responsible position in Rocky Mountains or other Western area. Box 9-50.

METALLURGICAL MATERIALS AND PROCESS MANAGER: Age 38, degree, advanced study. Broad background and experience in management and supervision of development, processing and application of metals and alloys, including thermoelectric materials. Powder metallurgy specialist. Solid record of achievement on many tough problems. Seeking greater challenge and responsibility. Resume on request. Box 9-55.

METALLURGIST: Solid background in production and application of toolsteels, stainless steels, superalloys, vacuum melted metals. Experience includes close cooperation with both production and sales. Present position offers little growth potential. Desires responsible position requiring personal initiative. Age 27, married, degree. Box 9-60.

METALLURGICAL MANAGER: B.S. Met. Eng., age 42, married. Twenty years broad experience in steel mill and forging operations, naval ordnance. Eight years top metallurgical responsibility for heavy manufacturing industry, also research experience. Intimate knowledge of ferrous and stainless alloys, superalloys, titanium, refractory metals. Strong background of technical sales support. Seeks manager opportunity in quality control, research development or technical representation areas. Box 9-65.

NUCLEAR AND ROCKET FABRICATION ENGINEER: With broad productive background, emphasis on stainless steel fabrication and, recently, ceramic and graphite fuels. Responsibilities have included delivery of three reactor cores, laboratory supervision, quality control standard preparation, project and departmental administration. Interested in responsible assignment to challenging problems. M.S. in Met. Eng. Box 9-70.

METALLURGICAL ENGINEER: Age 48, family, B.S. degree. Fourteen years as manager of commercial heat treating plants ranging from specialty to large production shops. Recent experience in aircraft plant included latest joining and best treating techniques. Past experience includes research and development investigations in ferrous and nonferrous processing, chief metallurgist in aircraft plant and steel mill operations. Box 9-75.

METALLURGICAL ENGINEER: B.S. degree, age 27, family. Five years experience in specialty steel business, including direction of production metallurgical laboratory and cold finishing process metallurgical control of wire mill. Experienced in stainless, high-temperature and alloy steels. Desires responsible position in East. Resume upon request. Box 9-80.

METALLURGICAL ENGINEER: B.S. degree, age 29, married, two children. Three years experience in welding of aluminum, inspection, report writing (technical and nontechnical). Also working knowledge of resistance welding, soldering, brazing and other special types of joining. Desires position in development or research. Prefers northeastern U.S. Resume available upon request. Box 9-85.

METALLURGIST: B.S. degree, age 42, family. Eighteen years diversified experience in ferrous and nonferrous heat treatment, cold heading, surface treatments, failure analysis and powder metallurgy. Extensive experience in all types of heat treatment and processing of powdered metal parts. Resume upon request. Box 9-90.

METALLURGIST: B.S. degree, age 30, family. Formal business training. Eight years administrative and technical experience. Background in forgings and extrusions. Interested in a position as plant metallurgist for a medium-size company or as technical representative for a larger firm in the metalworking field. Midwest location preferred. Resume on request. Box 9-95.

METALLURGIST: Age 41, married, two children. Diversified experience in both research and production. Background includes work in stainless steels, vacuum degassing, brittle fracture, corrosion and oxidation-resistant alloys. Supervisory experience in

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Applicant should be able to determine changes in crystal structure and dislocation movements by suitable metallographic, X-ray or electron diffraction techniques. He should be familiar with the mechanics of crack propagation and associated stress conditions. Experience in testing single crystals of pure substances and ability to correlate the information gained with the behavior of polycrystalline metals would be desirable.

For an immediate reply, write Mr. Melvin Vobach, Dept. 820, The Boeing Company, Wichita Division, Wichita 1, Kansas.

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RESEARCH METALLURGIST

To conduct experimental research on the various methods, such as vacuum, levitation and zone melting, of preparing high purity metals and alloys for metallurgical research.

Ultra modern laboratory, equipped with the finest research facilities. Requires a Ph.D. in metallurgical thermodynamics or a M.S. with experience in metallurgical research.

Scientific Laboratory
of the
FORD MOTOR COMPANY

You are invited to send a complete resume to:

Salaried Placement Section
Engineering and Research Staff
P.O. Box 2053
Dearborn, Michigan

Metallurgist—Metallographer

Challenging research opportunity in new fully-equipped Metals Research Laboratory located in New Haven, Connecticut. Position embraces broad range of Metallography serving an active non-ferrous Metallurgical Research program. Primary emphasis on Aluminum-Base and Copper-Base Alloys. Opportunity for constitutional studies, interpretation of structures, phase analysis and identification and development of new Metallographic techniques.

BS required preferably in Metallurgy. Maximum of 4 years' experience in non-ferrous Metallography.

Send resume including salary requirements to Leo C. Clancy

Olin

275 Winchester Ave. New Haven 4, Conn.

National needs: metallurgists

- **Research & Development** involving new processes and new materials applications. B.S. degree plus 2-5 years' experience with ferrous and non-ferrous small parts, carbon and alloy steel and powdered metallurgy.
- **If qualified and interested,** please respond promptly and in complete confidence. All qualified applicants will receive consideration for employment regardless of race, creed, color, or national original.
- **Write to:** Thomas F. Wade, Technical Placement, The National Cash Register Co., Main & K Streets, Dayton 9, Ohio.

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SENIOR RESEARCH SCIENTISTS

Outstanding opportunities for scientists with Physical Metallurgy or Ceramics background interested in basic materials research. Responsible positions available for Ph.D's preferably with post-doctorate research experience.

Current group interests are in mechanical properties of crystalline and non-crystalline solids, including single and polycrystalline ceramics, refractory metals and plastics; oxidation mechanisms in metals; alloys for high temperature thermocouple purposes. *Write in confidence to: Dr. C. H. Li, Honeywell Research Center, Hopkins, Minn.*

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To explore professional opportunities in other Honeywell locations, coast to coast, send your application in confidence to Mr. H. D. Eckstrom, Honeywell, Minneapolis 8, Minn. All qualified applicants will receive consideration for employment without regard to race, creed, color or national origin.

metallurgy, thoroughly grounded in practical aspects. Seeking challenging position. Available at once. Resume on request. Box 9-100.

METALLURGICAL ENGINEER: B.S. degree, 1954. Seven years diverse top-flight industrial experience, including production metallurgy, heat treatment, engineering liaison, production supervision. Well versed in the application and heat treatment of alloy constructional steels, nickel and cobalt-base superalloys, welding metallography and failure analysis. Desires position with management growth potential. Box 9-105.

RESEARCH FELLOWSHIP: Physical or process metallurgy desired. Graduate metallurgist with 21 years experience. Specialization in X-ray diffraction, X-ray spectrography, aluminum and steel physical metallurgy, failure analysis. Box 9-110.

METALLURGICAL ENGINEER: B.Met.E. degree, age 26, married, one child, graduate studies. Experience includes reciprocating and jet engine metallurgical failure analysis, quality control, extensive report writing. Desires production or development position with opportunity for advancement. Resume on request. Box 9-115.

METALLURGIST: M.S. degree, four years in fundamental research, five years in development, four years general engineering, plant metallurgy and production supervision. Seeking development, applied research or metallurgical supervision of laboratory or production. East or Midwest. Resume on request. Box 9-120.

Allied Chemical

RESEARCH METALLURGIST

Immediate career opportunity for a research metallurgist to conduct exploratory studies.

B.S. or advanced degree in metallurgy and 1-5 years experience required.

Modern research facilities located near Finger Lakes and Adirondack recreational areas of New York State. Liberal employee benefits.

Please send detailed résumé, including salary requirements, in confidence to

Central Personnel Department
SOLVAY PROCESS DIVISION
Allied Chemical Corporation
P.O. Box 271
Syracuse 1, New York

NONGRADUATE METALLURGIST: Age 27, married, three children. Background in heavy equipment industry includes metallography, both ferrous and nonferrous, failure analysis, trouble shooting, heat treating and manufacturing research and development. Also one and a half years heat treat supervisor. Location open. Desires challenging position with good future. Box 9-125.

METALLURGICAL ENGINEER: B.S. and M.S. degrees, family. Nineteen years experience in metallurgical research, corrosion, materials engineering and product development. Publications. Supervisory experience. Prefers responsible position in research and development. Will relocate. Resume on request. Box 9-130.

METALLURGIST: Aggressive man desires challenging job in administrative area. Ten years experience in materials engineering, heat treating, metallurgical laboratory and foundry work. Good administrative and technical background with experience in customer relations. Well versed in machining, cold heading and heat treat operations. Age 31, family, degree. Box 9-135.

SALES ENGINEER: Family man, age 32, aggressive type, desires position as technical representative or salesman. B.S. in Bus. Adm. with following professional experience: One year sales administration, three years assistant chief metallurgist, diesel fuel injection equipment and electrical product two years. Materials specification analyst with business machine manufacturing; two years in metallurgical quality control of aluminum foundry. Resident of Massachusetts, can relocate. Box 9-140.

MELTING

B.S. in Met. or Ch.E. 5 or more years experience in R & D on electric furnace or open-hearth melting problems, carbon or alloy steels. Strong background in physical metallurgy, thermo-dynamics of molten metals and stream or ladle degassing desirable. Five figure salary.

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associates inc.
Management Personnel Counselors
431 Frick Bldg. Gr. 1-2050
Pittsburgh 19, Pa.

MANAGER: Light metals field or related supervisory experience, metallurgical process engineering, pilot plant, process and product improvement and development, production problems and customer contact. Schooled in working relations with design, sales, quality control, production, research, patent and industrial engineering departments. Knows industrial equipment, union grievances. Domestic or foreign. Resume in confidence. Box 9-145.

CHEMIST-METALLURGIST: Ph.D. in chemistry. Research and development in powder metallurgy, high-temperature materials, hard metals, cermets, coating for high-temperature protection, development of analysis procedures. Numerous publications. Resume on request. Box 9-150.

STEEL FOUNDRY METALLURGIST: B.S. degree in Met. Eng., age 39, married, three children. Thirteen years steel experience, eight years chief metalurgist. Thorough knowledge of foundry melting, molding, cleaning, inspection, sands, chemical and physical testing, heat treatment and nondestructive testing methods. Desires position as chief metallurgist or plant metallurgist in progressive foundry. Will relocate, but prefers midwest or eastern location. Available immediately. Box 9-155.

ENGINEER: Graduate metallurgist seeks challenging position. East preferred, however, location can be immaterial for adequate compensation superceding current $10,000 per year. Diversified 13 years experience in ferrous and nonferrous processing, product development, heat treatment, materials application, nondestructive testing, quality control and manufacturing phases of nuclear fabrication. Report writing, customer-vendor contacts background as technical sales representative. Box 9-160.

RESEARCH OR DEVELOPMENT METALLURGIST: B.S., M.S. in physics, trained and experienced in metallurgy. Sixteen years research in alloy steels, titanium, zirconium, physical metallurgy of numerous alloy systems, application of X-ray diffraction to metallurgy, radioactivity, ceramics. Publications. Presently plant metallurgist for large plant. Age 44, family. Prefers western U.S. Box 9-165.

Allied Chemical

METALLURGICAL ENGINEER

For expanding applied metallurgical group engaged in selection of materials of construction, corrosion studies of ferrous and non-ferrous materials in chemical environment and the development of specific materials for chemical applications.

BS or MS required with two to ten years experience in metals applications, corrosion, metal fabrication, or related fields.

Location in attractive area of Central New York State.

Send detailed resumé to:

Personnel Supervisor
Solvay Process Division
Allied Chemical Corporation
P. O. Box 271
Syracuse 1, New York

SENIOR ENGINEER: Married, B.S. degree in metallurgy, 20 years diversified experience. Desires position offering increased responsibility such as materials or laboratory manager, principal consultant or product development engineer. Experience gained not solely in laboratory, but in manufacturing company as representative dealing with suppliers, etc. Mature, technically and administratively. Requires $20,000 salary. Resident of Eastern seaboard, but will consider other areas. Box 9-170.

METALLURGIST: B.S., age 35. Six years manufacturing and engineering experience with accessories, farm equipment and aircraft manufacturers and four years purchasing for high reliability electronics firm. Education, experience and interests lie with material selection and its processing for maximum reliability at minimum cost. Desires responsible materials engineer management or purchasing position. Box 9-175.

MANAGER: Top-level experience in automotive, aircraft and jet engine industries and casting industries covering materials engineering, manufacturing and research and development. Ferrous, nonferrous, and high-temperature metals and nonmetallics included, with broad knowledge of applications to products and manufacturing processes used. Interested in research, product development, production, sales, where background can be applied to mutual benefit. Box 9-180.

METALLURGICAL ENGINEER: B.S. degree, age 35, family, veteran. Ten years ferrous metallurgy experience with respected concerns. Research engineer on stainless and cast heat resistant steels, and to a limited extent on nickel-base high-temperature alloys. Melting supervisor and plant metallurgist in high production iron foundries. Desires responsible career position with industrial concern. Midwest preferred. Box 9-185.

• • •

Chapter Meetings for October

Oct. 2

Mohawk Valley—The Beeches, Rome. George R. Gohn . . . Fatigue in Metals

Oct. 6

Ontario—Prince George Hotel. F. G. Rice . . . Plastics—Where They Are Replacing Metals

Oct. 10

Tri-City—H. N. Ipsen . . . Vacuum Heat Treating and Processing

Oct. 18

Delaware Valley—C. L. McCabe . . . Use of Thermodynamics in the Solution of Industrial Problems

Long Island—Carl Hoppls' Restaurant. Cyril Stanley Smith . . . History of Metallurgical Science

Oct. 26

Boston—Faculty Club, MIT. Charles Mueller . . . Fabrication of Alloys Under Atmospheres (Infab)

The 16th METALLOGRAPHIC EXHIBIT

Detroit, October 23 to 27, 1961

All metallographers—
everywhere—
are cordially invited to
display their best work.

RULES FOR ENTRANTS

Exhibitors do not need to be members of the American Society for Metals.

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable.

Photographic prints should be mounted on stiff cardboard, extending no more than 3 in. beyond edge of print in any direction; maximum dimensions 14 by 18 in. (35 by 45 cm.). Heavy, solid frames are unacceptable.

Entries should carry a label on the *face of the mount* giving:

Classification of entry.

Material, etchant, magnification and other desirable data.

A brief statement (if desired) calling attention to any unusual aspect of the entry.

The name, company affiliation and postal address of the exhibitor should be placed on the *back of the mount* together with a request for return of the exhibit if so desired.

Entrants living outside the United States should send their micros by first-class letter mail endorsed "Photo for Exhibition — No Commercial Value — May Be Opened for Customs Inspection".

Exhibits must be delivered before Oct. 10, 1961, either by prepaid express, registered parcel post or first-class letter mail, addressed:

Metallographic Exhibit
American Society for Metals
Metals Park
Novelty, Ohio, U. S. A.

CLASSIFICATION OF MICROS

Class 1. Irons and steels, cast and wrought
Class 2. Stainless steels and heat resisting alloys
Class 3. Aluminum, magnesium, beryllium, titanium and their alloys
Class 4. Copper, nickel, zinc, lead and their alloys
Class 5. Uranium, plutonium, thorium, zirconium and reactor fuel and control elements
Class 6. Metals and alloys not otherwise classified
Class 7. Series showing transitions or changes during processing
Class 8. Welds and other joining methods
Class 9. Surface coatings and surface phenomena
Class 10. Slags, inclusions, refractories, cermets and aggregates
Class 11. Electron micrographs using replicas
Class 12. Electron micrographs (transmission)
Class 13. Color prints in any of the above classes
Class 14. Results by unconventional technique

AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which in the opinion of the judges closely approach the winner in excellence. A Grand Prize, in the form of an engrossed certificate and a money award of $500 from the Adolph I. Buehler Endowment will also be awarded the exhibitor whose work is judged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's national headquarters.

All prize-winning photographs will be retained by the Society for one year and placed in a traveling exhibit to the various ASM Chapters.

43rd NATIONAL METAL CONGRESS & EXPOSITION

Cobo Hall, Detroit——————Oct. 23 to 27, 1961

the 3 minute glass

It isn't often that I have the pleasure of inviting 34,000 important people to attend a single event as guests of the ASM. That however, is the happy situation that confronts me now as I invite each and every one of you, the 34,000 members of ASM, to attend an event that is specifically designed for you. It's your annual meeting, your national educational conference and exhibition, your Metal Show.

And since you are such a key figure behind the planning of this event, it gives me particular pleasure to report to you that this Metal Show, more than ever before, will truly be the metals, materials and process engineering event of 1961. Last year in Philadelphia, you will recall, the Society made some very important changes in the concept of the show, based on questionnaires and personal interviews in which you, as a member of ASM, let us know the type of show that would be of greatest benefit to you.

Out of this sampling of your needs and wishes emerged the 11 categories of metalworking as product qualifications for exhibitors, guaranteeing you the Metal Show you wish to see. It's most probably the first time that exhibitors in an exposition have been qualified in this manner, and you can take pride in the important part you've played.

Now, for 1961, ASM will present in Detroit a Metal Show with an even more intensified metals and materials personality. We here at Metals Park like to think of the Detroit Metal Show as the best yet, and certainly one you won't want to miss. From the dramatic and informative ASM Materials Application Center, to the last technical session, this Metal Show offers an unparalleled opportunity to look, to touch, to hear of all the new products and developments that you must know about if you want to keep abreast of everything happening in this rapidly expanding, increasingly competitive materials field.

The Materials Application Center, for example, is the first educational display of its kind. It will present scores of applications with technical data on each. Seven materials groups will be displayed under the towering Metal Show Quadrilon and seven pavilions roofed with symbolic girders radiating from the Quadrilon.

That's only the beginning. At the Detroit Metal Show, you'll see an estimated 250 educational exhibits by outstanding metalworking companies in the 11 categories. The Materials Application Center theme will be reflected in every exhibit. Each will be staffed by specialists, prepared to give you a personal "technical session" in any exhibit you choose to visit.

As if this weren't enough, you'll find the largest technical program in the 43-year history of the Metal Show. Upwards of 200 timely papers have been programmed in 68 sessions by ASM and nine other technical societies and trade associations. The emphasis will be on the kind of information you can take back with you, to use in increasing your personal effectiveness in your metalworking field. Truly, you'll find this event to be a one-week "short course" on recent developments and advances.

In making this most cordial invitation to you, the members of ASM, it goes without saying that there is no charge for ASM technical sessions and Metals Show exhibits. This is a most important and valuable Society service to its members.

It's there for the taking—the greatest array of Metal Show technical sessions and exhibits ever, plus the Materials Application Center, at Cobo Hall, Oct. 23-27. I'll look forward with a great deal of pleasure to meeting you there.

Allan Ray Putnam
Managing Director

CONTEMPORARY PROBLEMS OF METALLURGY . . .

was selected for translation into English because it offers Western scientists a comprehensive review of the most significant research and industrial applications in the field of metallurgy developed in the Soviet Union.

Soviet advances in the production of steel and pig iron are discussed at length by the authors of many papers in this comprehensive volume. Heat-resistant, austitic, and stainless steels have been subjected to a great deal of research in the USSR and data on various heat treatments and their effects on steel structures have been collected. Detailed descriptions of these methods are included in this book, assuring its value to all scientists and technologists concerned with metallurgical problems.

Of particular interest to Western metallurgists are discussions of Soviet use of self-fluxing sinter in blast-furnace burdents, the universal use of top pressures substantially above atmospheric, higher blast preheat temperatures, and the addition of oxygen for improved productivity.

In addition to reports on recent Soviet developments in the field of metallurgy, this volume contains chapters outlining achievements in China and in East Germany. "Continuous Steelmaking—Why Not?", a paper by Professor John F. Elliott, Massachusetts Institute of Technology, appears in print for the first time, in this volume.

SPECIAL PRICE TO ASM MEMBERS — $12.00/Non-Members — $16.00.

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If you're interested in "moving up the ladder" in your present company . . . if you want to become part of the "decision-making" team in your organization . . . broaden your knowledge of the metal-working industry . . . improve your present position and income . . . NOW is the time to investigate the advantages of enrollment in ASM'S METALS ENGINEERING INSTITUTE. Today, MEI offers more than 20 courses in metals subjects ranging from "Elements of Metallurgy" to "Metals for Nuclear Power". These comprehensive and inexpensive courses prepared and compiled by noted specialists in the fields of materials and processes, can be taken at home under the watchful guidance of the expert MEI staff. The Metals Engineering Institute courses of *your* selection can be a major step forward to a rewarding career in the metal-working industry.

Here's what MEI graduates say about this educational program:

". . . excellent and I will eventually take every subject you offer"

". . . thanks to your fine course, I have become a department supervisor"

**METALS ENGINEERING INSTITUTE, an educational "function" of the American Society for Metals*

Here is a partial list of courses offered through MEI

Elements of Metallurgy
Heat Treatment of Steel
High Temperature Metals
Titanium
Copper, Brass and Bronze
Magnesium
Tool Steels
Arc Welding
Blast Furnace Operations
Metals for Nuclear Power
Stainless Steels
Electroplating and Metal Finishing
Gray Iron Foundry Practice
Oxy-Acetylene Welding
Steel Foundry Practice
Recovery of Lead and Zinc
Steel Plant Processes
Ferrous Metallurgy
Corrosion
Principles of Machining
Principles of Heat Treating

Please send me complete information and costs on courses offered by MEI.

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Company _____

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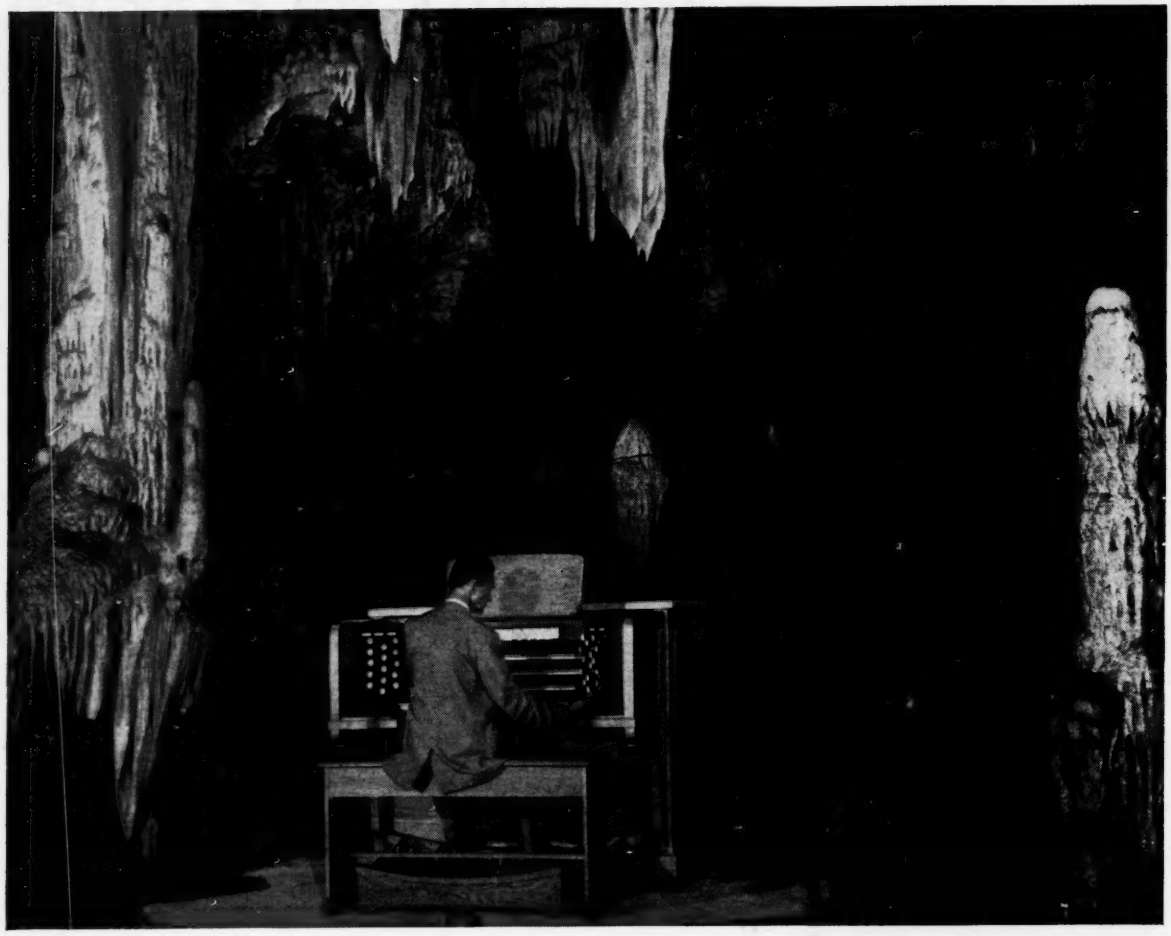
AMERICAN SOCIETY FOR METALS

METALS PARK, OHIO



How Nickel gets music out of solid rock

Deep in the Caverns of Luray in Virginia is one of the world's musical marvels—the famed "Stalacpipe" organ—a unique instrument that gets rare tonal beauty from age-old stalactites.

To get music out of solid rock, the stalactites have threaded metal rods bolted through them—close to small, wire-wound magnets. When an electronically-controlled hammer strikes a stalactite, the combination of rod and magnet becomes a tone generator whose impulses pass out through an amplifier.

Imagine the dampness of the Caverns . . . the rust-producing environment . . . and what could soon happen to these musical rods bolted through the rock. Here is where a metal has to really prove itself.

Nickel means trouble-free performance. To prevent excessive rust and resulting expansion that could easily crack or snap off the stalactites, a special electrical steel—a steel with Nickel in it—was chosen. This high nickel alloy steel—47-50% Nickel—stands up to the eternal dampness of this underground concert hall . . . and provides the exact combination of magnetic properties needed for low power requirements and full high fidelity.

Don't overlook Nickel even if you're not thinking of building an underground organ anytime soon. Alone or with other elements Nickel improves hundreds of alloys . . . makes possible almost any combination of properties for fabricating or service demands.

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Big tone from little Nickel alloy rods. Pen shows the size of Allegheny Ludlum Steel Corporation's AL-4750 nickel alloy special steel rods bolted through ancient stalactites. The rods vibrate with the rock after being struck by rubber-tipped hammers.

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